

PROGRAM OF STUDY

SECONDARY SCHOOL

1930

CONSTRUCTION ELECTRICITY

VOCATIONAL EDUCATION

Québec 

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PROGRAM OF STUDY

CONSTRUCTION ELECTRICITY

1930

The Construction Electricity program leads to
the Secondary School Vocational Diploma
and prepares the student to practise the trade of

CONSTRUCTION ELECTRICIAN

**SECONDARY SCHOOL
VOCATIONAL EDUCATION**

Gouvernement du Québec
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FOREWORD

This document was translated by Phyllis Aronoff, with the assistance of other members of the Education Development in the English Language translation team, ministère de l'Éducation.

Although much research went into the choice of technical terminology, there may remain in this document certain terms that are inaccurate or do not reflect current usage. The translators would very much appreciate receiving feedback from users of the document. They may be contacted at:

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INTRODUCTION

The Construction Electricity program is based on the orientations for secondary school vocational education adopted by the government in December 1986. It was designed on the basis of a new framework for developing vocational education programs that calls for the active participation of experts from the workplace and the field of education. It was developed with various factors in mind: training needs, the job situation, purposes, goals, and strategies and means used to attain objectives.

The program is developed in terms of competencies, which are then expressed as objectives, each of which constitutes a teaching module. These competencies are the minimum requirements for a diploma, for both young and adult students. The program of study not only lists the required competencies, it also provides the basis for organizing courses, planning teaching strategies, designing instructional and evaluation materials, and so on. It is the key document to be used for all related developments.

The total 1 350 hours allocated to the program is to be used not only for teaching but also for evaluation and remedial work. The 28 modules vary in length from 15 to 90 hours. Modules are of two types:

- a) those focussing on the specific competencies required to practise the trade (600 hours)
- b) those focussing on the more general, transferable occupational competencies (750 hours).

This document has four sections. The first three are of general interest and provide an overview of the training plan. They include a synoptic table of basic information about each module, a description of the program training goals and a list of the general objectives.

The fourth section is more specific and is designed primarily for those directly involved in implementing the program. It contains a description of the operational objectives of each module. Three appendices are provided to help the reader better understand and use the program. A fourth appendix lists the people who have contributed to the program.

In keeping with this broad approach, three accompanying documents will be provided: the Teaching Guide, the Evaluation Guide, and the Planning Guide.

1. SYNOPTIC TABLE

CONSTRUCTION ELECTRICITY

Number of modules : 28

Duration (in hours): 1 350

Credits : 90

PROGRAM CODE: 1930

CODE	N ^o	TITLE OF MODULE	DURATION	CREDITS*
786-012	1	The Training and the Trade	30	2
755-002	2	Health and Safety on Construction Sites	30	2
786-032	3	Tools, Equipment and Fastening Devices	30	2
755-004	4	Construction Sites, Equipment and Organizations	60	4
786-056	5	Analysing Direct Current Circuits	90	6
786-062	6	Interpreting and Applying the Québec Electrical Code and Hydro-Québec Standards	30	2
786-073	7	Reading and Interpreting Plans and Specifications	45	3
786-084	8	Installing Cable and Conduit	60	4
786-092	9	Planning and Problem-Solving	30	2
786-103	10	Installing and Modifying Circuits for Lighting and Receptacles	45	3

786-115	11	Analysing Alternating Current Circuits	75	5
786-122	12	Drawing Sketches and Diagrams	30	2
786-134	13	Installing a Low-Voltage Service Entrance	60	4
786-143	14	Handling Tools and Materials and Rigging Parts and Machines	45	3
786-153	15	Installing Very Low-Voltage Lampholders and Switches	45	3
786-165	16	Installing and Connecting Heating and Air-Conditioning Systems	75	5
786-173	17	Installing and Connecting Single-Phase and Three-Phase Transformers	45	3
786-185	18	Installing and Repairing DC Motors and Generators and their Control Circuits	75	5

1. SYNOPTIC TABLE

CONSTRUCTION ELECTRICITY

Number of modules : 28

Duration (in hours): 1 350

Credits : 90

PROGRAM CODE: 1930

CODE	N ^o	TITLE OF MODULE	DURATION	CREDITS*
786-195	19	Installing and Repairing AC Motors and Generators and their Control Circuits	75	5
786-205	20	Applying Electronics Concepts	75	5
786-213	21	Using Combinational Logic	45	3
786-223	22	Applying Welding Techniques	45	3
786-232	23	Using Sequential Logic	30	2
786-243	24	Installing and Connecting Alarm and Warning Systems	45	3
786-253	25	Installing and Connecting a Programmable Controller	45	3
786-264	26	Installing and Connecting a Control Panel	60	4
786-271	27	Applying Ecological Concepts	15	1
786-281	28	Creative Job Search	15	1

* 15 hours = 1 credit

--- Modules are grouped by semester.

This program leads to a Secondary School Vocational Diploma in Construction Electricity.

2. PROGRAM TRAINING GOALS

In this program of study, vocational education goals have been adapted to the distinctive nature of construction electricity. These goals are:

To ensure that students are prepared to enter the work force

To familiarize students with the job market, particularly the construction sector, as it relates to the trade of electrician.

To familiarize students with the rights and responsibilities of electricians.

To develop effectiveness in the practice of the trade

To teach students to carry out the activities of the trade correctly and at an acceptable standard of performance for entry-level positions on the job market.

To prepare students to perform satisfactorily on the job by developing:

- . the cognitive and psychomotor skills needed to install electrical equipment properly, safely, and in conformity with the standards
- . the cognitive skills needed to plan work wisely and choose materials, tools and equipment appropriately
- . the cognitive and psychomotor skills needed to solve problems effectively and maintain equipment properly
- . the ability to form good working relationships and to communicate effectively on the job
- . professional integrity
- . the habit of exercising caution with regard to environmental quality and occupational health and safety

To foster the continuing development of professional knowledge and attitudes

To develop autonomy, a sense of responsibility, a concern for excellence and a desire to succeed.

To develop creativity, initiative and an enterprising spirit.

To help students understand the underlying principles of the techniques used.

To develop good work habits, discipline, order and cleanliness.

To develop the ability to learn and to locate information and reference materials.

To ensure job mobility

To foster a positive attitude and a ability to adapt to technological changes and new situations.

To teach students creative job search techniques.

3. GENERAL OBJECTIVES

The general objectives of the Construction Electricity program are presented below, along with the major statement of each corresponding first-level operational objective.

To develop in the students the basic competencies needed to perform the tasks of the trade.

To gain a general knowledge of the types of construction sites, the equipment used, and the organizations involved in construction.

To gain a general knowledge of health and safety on construction sites.

To read and interpret plans and specifications.

To interpret and apply the Québec Electrical Code and Hydro-Québec standards.

To plan work and solve problems.

To install cable and conduit.

To use tools, equipment and fastening devices.

To draw sketches and diagrams.

To handle tools and materials and to rig parts and machines.

To apply ecological concepts.

To develop the competencies needed to perform moderately complex tasks.

To install and modify circuits for lighting and receptacles.

To install low-voltage service entrances.

To install very low-voltage lampholders and switches.

To install and connect alarm and warning systems.

To install and repair DC motors and generators and their control circuits.

To install and repair AC motors and generators and their control circuits.

To apply welding techniques used in the trade.

To analyse direct current circuits.

To analyse alternating current circuits.

To install and connect heating and air-conditioning systems.

To install and connect single-phase and three-phase transformers.

To develop the competencies needed to perform more complex tasks.

To install and connect a programmable controller.

To install and connect a control panel.

To use combinational logic.

To use sequential logic.

To apply electronics concepts.

To develop the competencies needed to enter the job market.

To determine one's suitability for the training and the trade.

To prepare for a creative job search.

4. FIRST- AND SECOND-LEVEL OPERATIONAL OBJECTIVES

4.1 Definition

First-level operational objectives are the main compulsory teaching/learning targets, and they are specifically evaluated for certification. Second-level operational objectives are intermediate teaching/learning targets deemed prerequisite for attaining first-level objectives.

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.

Please refer to **Appendix B: HOW TO READ BEHAVIOURAL OBJECTIVES** and to **Appendix C: HOW TO READ SITUATIONAL OBJECTIVES**.

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

The organization of competencies to be developed is shown in Appendix A. Two types of competencies are listed: those directly related to the practice of the specific occupation, and others of a more general nature but fundamental to the performance of specific occupational tasks. Also outlined are the sequential steps of the work process.

The symbol  indicates a correlation between a step and a specific competency.

The symbol  indicates that the correlation is to be taught and evaluated as part of the competency.

The symbol  indicates a correlation between a fundamental and a specific competency.

The symbol  indicates that the correlation is to be taught and evaluated as part of the specific competency.

4.2 Description of the Objectives by Module

CONSTRUCTION ELECTRICITY

MODULE 01

CODE: 786-012

TITLE: THE TRAINING AND THE TRADE

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE SITUATIONAL OBJECTIVE

EXPECTED OUTCOME

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

SPECIFICATIONS

At the end of this module, the students will:

- Understand the training process.
- Explain the realities of the trade.
- Confirm their career choice.

LEARNING CONTEXT

Outline of student activities:

PHASE 1: The Training Process

- Becoming acquainted with the training process: program of studies, requirements, teaching methods, means of evaluation, certification of studies.
- Becoming acquainted with the physical organization of the training facility and the resources available.
- Discussing the training program in relation to the work situation in construction electricity.

PARTICIPATION CRITERIA

The students must:

PHASE 1:

- Study the literature supplied.
- Listen carefully to the explanations provided.
- Express their views on the training program in a group meeting.

CONSTRUCTION ELECTRICITY

MODULE 01

CODE: 786-012

TITLE: THE TRAINING AND THE TRADE

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE SITUATIONAL OBJECTIVE

LEARNING CONTEXT

PHASE II: The trade

- Becoming familiar with the nature and requirements of the trade - tasks, physical and intellectual abilities required, educational prerequisites, hiring conditions, working conditions, criteria for performance evaluation, rights and responsibilities of workers - by means of visits, interviews, study of written materials.
- Becoming familiar with the trade associations, their relationships, and their role on a construction site.
- Learning about the trades related to construction electricity.
- Learning about the labour market in construction electricity - potential work environments (residential, commercial, institutional, industrial), equipment, services, job prospects and remuneration, opportunities for promotion and transfer, union organizations, labour relations - by means of visits, interviews, study of written materials.
- Learning about policies promoting women's access to non-traditional trades, and their impact on construction electricity.
- Presenting the information they have gathered in a group meeting and discussing their views on the trade: advantages and disadvantages, requirements, and so forth.

PARTICIPATION CRITERIA

PHASE II:

- Gather information on most of the topics covered.
- Express their views on the trade - in particular, its advantages and disadvantages, its requirements, the role of women - in a group meeting, using the information they have gathered.

CONSTRUCTION ELECTRICITY

MODULE 01

CODE: 786-012

TITLE: THE TRAINING AND THE TRADE

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE SITUATIONAL OBJECTIVE

LEARNING CONTEXT

PHASE III: Career planning

- Discussing the accuracy of their views on the trade following on-site visits.
- Defining their tastes, aptitudes and interests with regard to the trade and the training.
- Writing a report specifying their career choice, comparing the trade and its requirements with their tastes, aptitudes and interests.

PARTICIPATION CRITERIA

PHASE III:

- Write a report that:
 - . sums up their tastes, aptitudes and interests
 - . explains clearly how they arrived at their career choice

INSTRUCTIONAL GUIDELINES

The teacher will:

- Create a climate conducive to personal growth and vocational learning.
- Promote discussion among the students and encourage individual self-expression.
- Involve the students in the proposed activities.
- Offer the students an accurate and objective perception of the trade.
- Provide the students with adequate means of appraising their career choice honestly and objectively.
- Prevent students from undertaking vocational training for which they are unsuited.
- Organize visits to sites representative of work environments in construction electricity.
- Organize a meeting with members of the trade.
- Make available all pertinent literature: e.g. information on the trade and the training program, guides.
- Ensure that vocational guidance services are available to help students with career planning.

CONSTRUCTION ELECTRICITY

MODULE 01

CODE: 786-012

TITLE: THE TRAINING AND THE TRADE

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

01. To distinguish between the basic training program (SSVD) and further specializations (AVS).

02. To state the prerequisites for entering the training program.

03. To show the importance of solid training in terms of the needs of the labour market.

Phase I: The training process

04. To identify interests that suit one for the trade, such as enjoying working with one's hands and working in a team.

05. To identify behaviour and attitudes that are essential in the trade (professional ethics).

06. To list the tasks performed in construction electricity, taking into account their relative importance and how frequently they occur in the work context.

07. To become aware of women's entry into construction electricity.

08. To take note of health and safety measures during on-site visits.

09. To develop attitudes conducive to effective communication during the on-site visits and group meetings that are part of the training.

Phase II: The trade

10. To identify differences in views before and after the on-site visits and the meetings with members of the trade.

11. To identify the basic information to be included in the report.

Phase III: Career planning

TO DETERMINE THEIR SUITABILITY FOR THE TRAINING AND THE TRADE.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
SITUATIONAL OBJECTIVE**

EXPECTED OUTCOME

By participating in the required activities of the learning context according to the indicated criteria, the students will
gain a general knowledge of health and safety on construction sites.

SPECIFICATIONS

At the end of this module, the students will:

- Be familiar with the laws and regulations governing health and safety on construction sites.
- Be familiar with the roles and responsibilities of safety representatives and safety officers.
- Be aware of the hazards and safety measures related to performing certain tasks.
- Be aware of the hazards and safety measures related to the construction site itself.
- Be aware of the hazards and safety measures related to using certain products.
- Know what to do in case of an accident.

LEARNING CONTEXT

Outline of student activities:

Phase I: Information

- Becoming familiar with the objectives of the unit.

Phase II: Learning

- Receiving information on the topic covered in the unit.
- Forming and expressing an opinion on the topic.
- Asking questions.
- Listing the main concepts and underlying principles of safe behaviour.
- Assessing their own observance of these principles.

Phase III: Reinforcement

- Reviewing the main concepts of the unit.
- Answering a series of questions.
- Correcting the answers and discussing them if necessary.

CONSTRUCTION ELECTRICITY

MODULE 02

CODE: 755-002

TITLE: HEALTH AND SAFETY ON CONSTRUCTION SITES

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE

SITUATIONAL OBJECTIVE

PARTICIPATION CRITERIA

The students must:

- Participate in at least 16 out of the 20 units, Unit 1 being compulsory.
- Pay attention in class.
- Stick to the topic.
- Behave properly.
- Ask pertinent questions.
- Give appropriate answers.
- Do the exercises conscientiously.
- Correct all errors.

INSTRUCTIONAL GUIDELINES

The teacher will:

- Use a suitable room and proper materials.
- Present the material in a dynamic manner.
- Encourage the students to engage in group discussion.
- Make good use of teaching materials (e.g. tables, transparencies, films, videotapes, cards).

CONSTRUCTION ELECTRICITY

MODULE 02

CODE: 755-002

TITLE: HEALTH AND SAFETY ON CONSTRUCTION SITES

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

01. To list the laws and regulations governing occupational health and safety in Québec.
02. To state the rights and obligations of employers and workers.
03. To list the special provisions respecting construction sites.
04. To identify the causes and effects of industrial accidents and occupational diseases in the construction industry.
05. To identify the chemical, physical, biological, mechanical and psychosocial health hazards on construction sites.
06. To name some of the effects of health hazards on construction workers.
07. To identify the rights, obligations, roles and responsibilities of safety representatives and safety officers.
08. To identify the operations requiring the use of signs and signals, and public safety measures.
09. To identify the nature and purpose of the different methods of signalling and the meanings of the signals, as set forth in the Safety Code for the construction industry.
10. To identify when and how personal protective equipment must be used, as set forth in the Safety Code.
11. To identify when and how collective safety equipment must be used, as set forth in the Safety Code.
12. To identify the hazards and safety measures related to housekeeping on construction sites.
13. To identify the hazards and safety measures related to means of access and to work posture.
14. To identify the devices and safety measures for preventing falls, as set forth in the Safety Code.
15. To identify the main tools used on construction sites, as well as possible injuries, safety measures and the effects of hazardous substances associated with the use of these tools.
16. To identify the types of scaffolding and the safety measures for erecting, installing, using and dismantling them, as set forth in the Safety Code.
17. To identify the safety measures for operations requiring the use of heavy machinery, as set forth in the Safety Code.
18. To identify the hazards and safety measures related to working near trenches and excavations.

CONSTRUCTION ELECTRICITY

MODULE 02

CODE: 755-002

TITLE: HEALTH AND SAFETY ON CONSTRUCTION SITES

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

19. To identify the hazards and safety measures related to working in trenches and excavations.
20. To identify the safety measures for working near power lines or on jobs requiring the use of electricity, as set forth in the Safety Code.
21. To identify the basic precautions to be taken at the scene of an accident, and the roles of first-aiders and the different health centres and departments.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE**

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
use tools, equipment and fastening devices
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . diagrams or rough sketches
 - . specific instructions
- Using:
 - . four different types of anchors
 - . a concrete wall or block
 - . a mounting, or materials to be anchored

GENERAL PERFORMANCE CRITERIA

- Conformity to health and safety standards
- Proper sequence of steps
- Use of appropriate methods and techniques
- Respect for standards
- Careful handling of tools and materials

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Observe health and safety rules.

SPECIFIC PERFORMANCE CRITERIA

- Understanding and systematic observance of safety measures

CONSTRUCTION ELECTRICITY

MODULE 03

CODE: 786-032

TITLE: TOOLS, EQUIPMENT AND FASTENING DEVICES

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Perform simple tasks using hand or power tools:
 - . drilling
 - . trimming
 - . threading a shank
 - . tapping
 - . cutting
- Use anchors to fasten material to:
 - . a concrete wall or block
 - . wood
 - . gypsum wallboard
 - . metal

SPECIFIC PERFORMANCE CRITERIA

- Conformity to required specifications
- Use of appropriate techniques and methods
- Choice of correct anchor or mounting device
- Use of appropriate tools
- Use of proper fastening technique
- Placement according to specifications
- Levelness and plumbness
- Solid anchor or mounting

CONSTRUCTION ELECTRICITY

MODULE 03

CODE: 786-032

TITLE: TOOLS, EQUIPMENT AND FASTENING DEVICES

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To recognize when a tool is defective.
- To use equipment, tools and accessories properly.
- To become aware of the need for precision in executing work.

01. To identify the various hand and power tools.

Observe health and safety rules.

02. To perform regular maintenance on the tools.

Perform simple tasks using manual and electric tools:

- . drilling
- . trimming
- . threading a shank
- . tapping
- . cutting

03. To know the specific uses of the various types of anchoring and mounting devices.

04. To relate materials and tools to the various types of anchors and mounting devices.

Use anchors to fasten material to:

- . a concrete wall or block
- . wood
- . gypsum wallboard
- . metal

TO USE TOOLS, EQUIPMENT AND FASTENING DEVICES.

CONSTRUCTION ELECTRICITY

MODULE 04

CODE: 755-004

TITLE: CONSTRUCTION SITES, EQUIPMENT AND ORGANIZATIONS

DURATION: 60 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE SITUATIONAL OBJECTIVE

EXPECTED OUTCOME

By participating in the required activities of the learning context according to the indicated criteria, the students will

gain a general knowledge of the types of construction sites, the equipment used, and the organizations involved in construction, in particular:

- the operations involved in setting up, organizing and equipping various types of construction sites
- the roles and responsibilities of those involved in setting up a project
- the materials, equipment and tools commonly used on construction sites
- the main roles and responsibilities of employers' organizations and union associations
- the laws and regulations governing labour relations in the construction industry

LEARNING CONTEXT

Outline of student activities:

Phase I: Information

- Becoming familiar with the objectives of the unit.

Phase II: Learning

- Receiving information on the topic covered in the unit.
- Expressing opinions and asking questions on the topic.

Phase III: Reinforcement

- Reviewing the important concepts of the unit.
- Answering a series of questions individually.
- Correcting the answers in a group.

CONSTRUCTION ELECTRICITY

MODULE 04

CODE: 755-004

TITLE: CONSTRUCTION SITES, EQUIPMENT AND ORGANIZATIONS

DURATION: 60 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE SITUATIONAL OBJECTIVE

PARTICIPATION CRITERIA

The students must:

- Participate in:
 - . 17 out of 23 units on the theme "Organization of a Construction Site."
 - . 6 out of 8 units on the theme "Construction Equipment."
 - . 7 out of 9 units on the theme "The Legal and Institutional Context."
- Pay attention in class.
- Stick to the topic.
- Behave properly.
- Ask pertinent questions.
- Give appropriate answers.
- Do the exercises conscientiously.
- Correct all errors.

INSTRUCTIONAL GUIDELINES

The teacher will:

- Use a suitable room and proper materials.
- Present the material in a dynamic manner.
- Encourage the students to engage in group discussion.
- Use charts and illustrations.

CONSTRUCTION ELECTRICITY

MODULE 04

CODE: 755-004

TITLE: CONSTRUCTION SITES, EQUIPMENT AND ORGANIZATIONS

DURATION: 60 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

01. To describe the characteristics and economic importance of the construction industry.
02. To identify the steps to be taken before setting up a construction site.
03. To describe the roles, responsibilities and relationships of those involved in setting up a construction site.
04. To identify the main legal restrictions to be considered while planning and operating a construction site.
05. To identify the types of work related to road construction (e.g. construction of bridges, viaducts, tunnels, highways), the materials and equipment used, and the characteristics related to the organization of these types of construction sites.
06. To identify the steps involved in building aqueducts, sewers and pipelines, including the underground work, and the characteristics related to the organization of these types of construction sites.
07. To identify the types of work involved in building dams, power plants, transmission lines and transformer stations, and the characteristics related to the organization of these types of construction sites.
08. To identify the steps involved in installing distribution lines and communications networks, and the characteristics related to the organization of these types of construction sites.
09. To identify the types of buildings, their uses, basic structures, and main systems, as well as the equipment and materials used in their construction, including those related to production machinery.
10. To identify the principles applicable to the basic structure of a building, the types of structures (wood, concrete and steel) and the details of construction of the main parts (e.g. walls, floors, roof, stairs).
11. To identify the main types of roofs and the major features of roofing.
12. To identify the details of construction of various systems such as electrical and mechanical systems (e.g. plumbing, heating, ventilation, refrigeration, air conditioning) and how these systems are integrated into the structure of a building.
13. To identify the elements related to insulating buildings.
14. To identify the main elements related to building partitions and ceilings.

CONSTRUCTION ELECTRICITY

MODULE 04

CODE: 755-004

TITLE: CONSTRUCTION SITES, EQUIPMENT AND ORGANIZATIONS

DURATION: 60 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

15. To identify the main types of exterior wall coverings, the methods of fastening them, and the various types of landscaping.
 16. To identify the main types of interior finishing materials, moulding and trim, and floor coverings.
 17. To identify the hand tools and measuring and levelling instruments used in the construction industry, and their main uses.
 18. To identify the portable electric, mechanical and pneumatic tools used in the construction industry, and their main uses.
 19. To identify the motorized and pneumatic equipment commonly used in the construction industry.
 20. To identify the main types of lifting and handling apparatus used for moving equipment and materials.
 21. To identify the types of interior and exterior scaffolding used in the construction industry, and their main characteristics.
 22. To become familiar with the Act respecting labour relations, vocational training and manpower management in the construction industry, and its scope.
 23. To identify the laws and regulations respecting labour relations in the construction industry, and the Construction Decree.
 24. To identify the employers' organizations and their roles and responsibilities.
 25. To identify the representative union associations and their roles and responsibilities.
 26. To identify the provisions related to vocational training and qualification and manpower management in the construction industry.
 27. To identify the main provisions regarding supplemental fringe benefit plans in the construction industry.
 28. To identify the main functions of the Commissaire de la construction, the Conseil d'arbitrage, and the Régie des entreprises de construction du Québec.
 29. To identify the composition, structure and main functions of the Commission de la construction du Québec (CCQ).
 30. To identify the powers of the CCQ and the provisions regarding violations of the Act respecting labour relations, vocational training and manpower management in the construction industry, or its regulations.
- TO ACQUIRE A GENERAL KNOWLEDGE OF THE TYPES OF CONSTRUCTION SITES, THE EQUIPMENT USED, AND THE ORGANIZATIONS INVOLVED.

CONSTRUCTION ELECTRICITY

MODULE 05

CODE: 786-056

TITLE: ANALYSING DIRECT CURRENT CIRCUITS

DURATION: 90 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
analyse direct current circuits
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- Using:
 - . a complex circuit containing six resistors
 - . a diagram of the circuit
 - . the appropriate tools and instruments, including a voltmeter, an ammeter and an ohmmeter

GENERAL PERFORMANCE CRITERIA

- Proper use of tools and instruments
- Clean, careful work
- Result:
 - . correct calculation of the parameters of the circuit
 - . accurate breakdown of the circuit

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Explain the laws of electricity.
- Interpret circuit diagrams and their features.

SPECIFIC PERFORMANCE CRITERIA

- Mastery of basic calculations involving Ohm's Law
- Correct interpretation of symbols and conventions
- Circuit consistent with diagram

CONSTRUCTION ELECTRICITY

MODULE 05

CODE: 786-056

TITLE: ANALYSING DIRECT CURRENT CIRCUITS

DURATION: 90 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE

BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Compare the parameters of various circuits.
- Explain the connection of batteries and storage cells.
- Explain the laws of magnetism and electromagnetism.

SPECIFIC PERFORMANCE CRITERIA

- Accurate measurements and calculations
- Explanation of differences
- Production of the desired voltage and current
- Understanding of the basic principles

CONSTRUCTION ELECTRICITY

MODULE 05

CODE: 786-056

TITLE: ANALYSING DIRECT CURRENT CIRCUITS

DURATION: 90 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To learn to handle equipment and measuring instruments with care. **Explain how to connect batteries and storage cells.**
- To develop a sense of observation. 08. To describe the characteristics of a magnet.
- To develop the ability to understand abstract phenomena. 09. To describe the phenomenon of electro-magnetism.
- To take pride in accurate and neat work. 10. To describe the characteristics of DC measuring instruments.
- 01. To describe the structure of matter. **Explain the laws of magnetism and electromagnetism.**
- 02. To describe the methods of producing electricity.
- 03. To explain electrical terms:
 - .voltage
 - .current
 - .resistance
 - .conductance**TO ANALYSE DIRECT CURRENT CIRCUITS.**

Explain the laws of electricity.

04. To identify the components of DC circuits.

05. To test the components of circuits.

Interpret circuit diagrams and their features.

06. To calculate the parameters of circuits.

07. To connect measuring instruments to a circuit.

Compare the parameters of various circuits.

CONSTRUCTION ELECTRICITY

MODULE 06

CODE: 786-062

TITLE: INTERPRETING AND APPLYING THE QUÉBEC ELECTRICAL CODE
AND HYDRO-QUÉBEC STANDARDS

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
interpret and apply the Québec Electrical Code and Hydro-Québec standards
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of specific instructions
- Using:
 - . the Québec Electrical Code
 - . Hydro-Québec standards

GENERAL PERFORMANCE CRITERIA

- Ability to locate the applicable regulation
- Unambiguous interpretation of standards and regulations
- Proper use of tables

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Use the sections of the Code.
- Use the index to the Code.
- Interpret the most common regulations.
- Interpret the most common tables.
- Interpret Hydro-Québec standards.

SPECIFIC PERFORMANCE CRITERIA

- Satisfactory understanding of the structure of the Code
- Methodical approach
- Clear understanding
- Ability to locate information
- Clear understanding

CONSTRUCTION ELECTRICITY

MODULE 06

CODE: 786-062

TITLE: INTERPRETING AND APPLYING THE QUÉBEC ELECTRICAL CODE
AND HYDRO-QUÉBEC STANDARDS

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To realize the importance of applying the Québec Electrical Code.

- To develop the habit of looking up information on electrical installations.

01. To name the organizations involved in applying the Code.

02. To identify the parts of the Code.

03. To interpret the vocabulary (Section 0).

Use the sections of the Code.

Use the index to the Code.

Interpret the most common regulations.

Interpret the most common tables.

04. To know the colour code.

Interpret Hydro-Québec standards.

TO INTERPRET AND APPLY THE QUÉBEC ELECTRICAL CODE
AND HYDRO-QUÉBEC STANDARDS.

CONSTRUCTION ELECTRICITY

MODULE 07

CODE: 786-073

TITLE: READING AND INTERPRETING PLANS AND SPECIFICATIONS

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
read and interpret plans and specifications
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . plans and specifications of an electrical installation
 - . specific instructions
- Using catalogues

GENERAL PERFORMANCE CRITERIA

- Orderly method of working
- Attention to detail
- Accurate interpretation

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Identify various elements of an architectural plan.
- Use specifications and plans of electrical installations.
- Make revisions to a plan.

SPECIFIC PERFORMANCE CRITERIA

- Correct interpretation of symbols and conventions
- Accurate identification of structures, materials, etc.
- Conformity to specifications
- Accuracy
- Legible writing using vertical gothic lettering

CONSTRUCTION ELECTRICITY

MODULE 07

CODE: 786-073

TITLE: READING AND INTERPRETING PLANS AND SPECIFICATIONS

DURATION: 45 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To develop a sense of observation.
- To realize the importance of using the appropriate terminology and symbols.
- To become aware of the need for precision in executing work.

01. To distinguish between a lot and a subdivision.

02. To become familiar with site plans.

03. To identify symbols and conventions on a plan:

- . plumbing
- . heating
- . steel structure
- . concrete
- . electrical installations

04. To identify electrical accessories on a plan.

Identify various elements of an architectural plan.

Use specifications and plans of electrical installations.

Make revisions to a plan.

TO READ AND INTERPRET PLANS AND SPECIFICATIONS.

CONSTRUCTION ELECTRICITY

MODULE 08

CODE: 786-084

TITLE: INSTALLING CABLE AND CONDUIT

DURATION: 60 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

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

CONDITIONS FOR PERFORMANCE EVALUATION

- Teamwork
- On the basis of:
 - . specifications including a section of half-inch tubing and a threaded section of half-inch rigid conduit requiring at least two 90° bends and two offsets
 - . specific instructions
- Using:
 - . appropriate equipment and tools
 - . an installation diagram
 - . safety equipment
- Surface wiring method

GENERAL PERFORMANCE CRITERIA

- Observance of health and safety rules
- Careful and clean work
- Conformity to plans and specifications
- Conformity to the Québec Electrical Code

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Identify the various types of cable.

SPECIFIC PERFORMANCE CRITERIA

- Accurate classification of the various types of cable
- Rapid location of appropriate tables and regulations of the Code
- Choice of appropriate cable for the intended use

CONSTRUCTION ELECTRICITY

MODULE 08

CODE: 786-084

TITLE: INSTALLING CABLE AND CONDUIT

DURATION: 60 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Observe health and safety rules.
- Bare conductors and connect them in boxes.
- Perform operations on conduit and tubing, such as:
 - . cutting
 - . reaming
 - . threading
 - . gluing
- Install conduits.
- Draw conductors into conduit systems.

SPECIFIC PERFORMANCE CRITERIA

- Understanding and systematic use of protective measures
- Use of proper method to bare conductors
- Solid connections
- Accurate measurement of lengths
- Conformity to installation plan
- Neat appearance of finished work
- Solid fastenings
- Neat appearance of finished work
- Proper drawing technique
- Accurate marking of conductors
- Use of appropriate technique

CONSTRUCTION ELECTRICITY

MODULE 08

CODE: 786-084

TITLE: INSTALLING CABLE AND CONDUIT

DURATION: 60 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To adopt safe work practices.
- To use materials economically and handle equipment with care.
- To take pride in doing work well.
- 06. To observe operations on stress cones and pot heads.

TO INSTALL CABLE AND CONDUIT.

Identify the various types of cable.

- 01. To identify the various types of boxes and other cable accessories.

Observe health and safety rules.

Bare conductors and connect them in boxes.

- 02. To describe the various types of ordinary and special conduit systems and their accessories.

- 03. To measure conduit.

- 04. To describe the techniques for using tools and equipment.

Perform operations on conduit and tubing, such as:

- . cutting
- . reaming
- . threading
- . gluing

Install conduits.

- 05. To communicate information satisfactorily.

Draw conductors into conduit systems.

CONSTRUCTION ELECTRICITY

MODULE 09

CODE: 786-092

TITLE: PLANNING AND PROBLEM-SOLVING

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
plan work and solve problems
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a work order
 - . plans and specifications
 - . a simulated situation (planning)
 - . mathematics and physics problems related to construction electricity (problem-solving)
- Using catalogues and manufacturers' manuals

GENERAL PERFORMANCE CRITERIA

- Logical method of solving problems
- Accurate calculations
- Systematic understanding of the logic involved in planning

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Solve mathematics problems related to the trade.
- Solve physics problems related to the trade.
- Identify the effects of electricity on the human body (applied biology).
- Identify the steps involved in planning electrical work.

SPECIFIC PERFORMANCE CRITERIA

- Satisfactory understanding and correct solution
- Satisfactory understanding and correct solution
- Clear understanding
- Systematic understanding of the planning process
- Logical approach

CONSTRUCTION ELECTRICITY

MODULE 09

CODE: 786-092

TITLE: PLANNING AND PROBLEM-SOLVING

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

Solve mathematics problems related to the trade.

Solve physics problems related to the trade.

Identify the effects of electricity on the human body (applied biology).

01. To receive a work order or general instructions (planning).

02. To visit the site and gather information.

03. To do a temporary installation.

04. To call for an inspection when necessary.

05. To systematically organize the work to be done in stages.

06. To plan the time required for the work.

07. To select and prepare materials, equipment and tools.

08. To organize the work area.

Identify the steps involved in planning electrical work.

TO PLAN WORK AND TO SOLVE PROBLEMS.

CONSTRUCTION ELECTRICITY

MODULE 10

CODE: 786-103

TITLE: **INSTALLING AND MODIFYING CIRCUITS FOR LIGHTING AND RECEPTACLES**

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install and modify circuits for lighting and receptacles** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working in teams of two
- On the basis of:
 - . installation specifications
 - . a real or simulated situation
 - . specific instructions
- Using:
 - . the appropriate tools
 - . a surface or concealed wiring system

GENERAL PERFORMANCE CRITERIA

- Observance of health and safety rules
- Conformity to the Québec Electrical Code
- Conformity to the specific instructions
- Careful and clean work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Read and interpret plans and specifications.
- Observe health and safety rules.
- Install boxes for lighting and receptacles.

SPECIFIC PERFORMANCE CRITERIA

- Correct location of components on plans
- Accurate interpretation
- Understanding and systematic use of protective measures
- Conformity to the Québec Electrical Code
- Appropriate fastening for the finishing planned
- Location in conformity with plans

CONSTRUCTION ELECTRICITY

MODULE 10

CODE: 786-103

TITLE: **INSTALLING AND MODIFYING CIRCUITS FOR LIGHTING AND RECEPTACLES**

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Install wiring and connect it to panel.
- Connect and attach accessories.
- Modify a wiring installation for lighting or receptacles.

SPECIFIC PERFORMANCE CRITERIA

- Economical use of materials
- Appearance of the wiring
- Use of proper method of drawing cables
- Conformity to specifications
- Correct, safe installation of accessories
- Circuit operational with additions or reductions
- Conformity to the Québec Electrical Code
- Neat finishing

CONSTRUCTION ELECTRICITY

MODULE 10

CODE: 786-103

TITLE: INSTALLING AND MODIFYING CIRCUITS FOR LIGHTING AND RECEPTACLES

DURATION: 45 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To use materials economically and handle equipment with care.
- To adopt safe work methods.
- To take pride in doing work well.

01. To identify commonly used equipment.

Read and interpret plans and specifications.

02. To fill out requisitions for materials.

Observe health and safety rules.

Install boxes for lighting and receptacles.

03. To use drilling equipment.

Install wiring and connect it to panel.

04. To identify fastening methods and lighting accessories.

Connect and attach accessories.

05. To identify the ways of protecting cables and equipment.

06. To turn on and test circuits.

Modify a wiring installation for lighting or receptacles.

TO INSTALL AND MODIFY CIRCUITS FOR LIGHTING AND RECEPTACLES.

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
analyse alternating current circuits
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a circuit that includes a resistor, an inductor and a condenser connected in series or in parallel
 - . instructions and a circuit diagram
- Using appropriate tools and instruments

GENERAL PERFORMANCE CRITERIA

- Proper use of tools and instruments
- Clean, careful work
- Result:
 - . correct calculation of the parameters of the circuit
 - . accurate breakdown of the circuit

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret the values of a sine wave.
- Interpret circuit diagrams and phasor diagrams.
- Compare the parameters of circuits:
 - . impedance, reactance, resonance
 - . voltage, current
 - . power
 - . power factor, phase displacement

SPECIFIC PERFORMANCE CRITERIA

- Accuracy
- Use of correct terminology
- Correct interpretation of symbols, conventions and phasor diagrams
- Accurate measurements and calculations

CONSTRUCTION ELECTRICITY

MODULE 11

CODE: 786-115

TITLE: ANALYSING ALTERNATING CURRENT CIRCUITS

DURATION: 75 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To become aware of the need for precision in executing work.

- To test the operating condition of components.

- To develop the ability to understand abstract phenomena.

01. To explain the generation of a sine wave.

02. To define the terms associated with alternating current.

03. To calculate the values of a sine wave.

04. To use an oscilloscope.

Interpret the values of a sine wave.

05. To describe the characteristics of inductors.

06. To describe the characteristics of transformers.

07. To describe the characteristics of condensers.

08. To interpret the colour codes used for condensers.

09. To recognize defective components by sight, smell or touch.

10. To interpret phasor diagrams.

11. To calculate and measure the time constant of R-C and R-L circuits.

Interpret circuit diagrams and phasor diagrams.

12. To use alternating current measuring instruments.

13. To calculate and measure the parameters of series and parallel R-L-C circuits.

14. To calculate and measure the parameters of series and parallel resonant circuits.

Compare the parameters of circuits:

. impedance, reactance, resonance

. voltage, current

. power

. power factor, phase displacement

TO ANALYSE ALTERNATING CURRENT CIRCUITS.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE**

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
draw sketches and diagrams
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . specific instructions
 - . orthographic projections or a perspective drawing
- Using:
 - . drawing instruments (diagram)
 - . no drawing instruments other than a pencil and eraser (freehand sketch of an orthographic projection)

GENERAL PERFORMANCE CRITERIA

- Proper technique in using drawing instruments
- Precise measurements
- Correct dimensions
- Attention to detail
- Neatness

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Draw geometric figures.
- Draw figures:
 - . top view
 - . front view
 - . side view

SPECIFIC PERFORMANCE CRITERIA

- Appropriate choice of drawing instruments
- Use of projection around the 45° line
- Appropriate choice of instruments

CONSTRUCTION ELECTRICITY

MODULE 12

CODE: 786-122

TITLE: **DRAWING SKETCHES AND DIAGRAMS**

DURATION: 30 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Dimension a part.
- Draw freehand sketches of the top view, the front view, and a side view of a part.
- Draw sectional views of a part.

SPECIFIC PERFORMANCE CRITERIA

- Clarity of the dimensioning (no crossed lines)
- Correct placement of dimension lines and extension lines
- Use of standard dimensioning technique
- Proper method of vertical gothic lettering
- Sketch drawn as faithfully as possible
- Accurate observation
- Clear representation

CONSTRUCTION ELECTRICITY

MODULE 12

CODE: 786-122

TITLE: DRAWING SKETCHES AND DIAGRAM

DURATION: 30 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To develop the ability to remember objects.
- To take care of drawing materials.
- To transpose a three-dimensional object onto paper.

01. To be familiar with the International System (SI) and the English system of measurements.

02. To use drawing instruments.

03. To take measurements.

04. To do freehand vertical gothic lettering.

Draw geometric figures.

05. To describe the procedure for drawing a part.

Draw figures:

- . top view
- . front view
- . side view

06. To interpret scales.

Dimension a part.

07. To identify the lines and surfaces of a part by means of letters and numbers.

Draw freehand sketches of the top view, the front view, and a side view of a part.

Draw sectional views of a part.

08. To read and interpret mechanical assembly drawings.

TO DRAW SKETCHES AND DIAGRAMS.

CONSTRUCTION ELECTRICITY

MODULE 13

CODE: 786-134

TITLE: INSTALLING A LOW-VOLTAGE SERVICE ENTRANCE

DURATION: 60 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
install low-voltage service entrances
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working in teams of two
- On the basis of:
 - . plans and specifications for a residence
 - . the Québec Electrical Code and Hydro-Québec standards
- Using:
 - . appropriate equipment and materials
 - . protective equipment

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to plans and specifications
- Conformity to the Québec Electrical Code and Hydro-Québec standards

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Calculate service requirements for a residence.
- Draw up a list of materials needed.
- Observe health and safety rules.
- Install the equipment.

SPECIFIC PERFORMANCE CRITERIA

- Observance of Québec Electrical Code rules
- Accurate calculations
- Proper distribution of load
- Accurate listing, with exact numbers, of materials and equipment
- Understanding and systematic use of protective measures
- Solid fastenings
- Correct arrangement of components

CONSTRUCTION ELECTRICITY

MODULE 13

CODE: 786-134

TITLE: INSTALLING A LOW-VOLTAGE SERVICE ENTRANCE

DURATION: 60 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE

BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Identify the equipment required for an industrial installation.

SPECIFIC PERFORMANCE CRITERIA

- Accurate identification of equipment
- Choice of appropriate equipment for the specific need
- Accurate assessment of the various parts of the load

CONSTRUCTION ELECTRICITY

MODULE 13

CODE: 786-134

TITLE: INSTALLING A LOW-VOLTAGE SERVICE ENTRANCE

DURATION: 60 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To develop the habit of taking good care of tools and equipment and keeping the work area clean.
- To use tools, equipment and fastening devices properly.
- To use materials economically and handle equipment with care.

01. To become familiar with the types of distribution panels offered by the supplier.

Calculate service requirements for a residence.

02. To determine the type of installation required.

Draw up a list of the materials needed.

Observe health and safety rules.

Install the equipment.

03. To know the equipment required for a commercial installation.

Describe the equipment required for an industrial installation.

TO INSTALL LOW-VOLTAGE SERVICE ENTRANCES.

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must handle tools and materials and rig parts and machines in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working in teams of two
- On the basis of:
 - . installation manuals
 - . handling plans
 - . crane operators' manuals
 - . charts
- Using:
 - . manual rigging equipment such as cables, slings, pulleys, hooks, grips, rollers, jacks, lag screws, winches
 - . other equipment such as bottles of compressed air, electric winches, electric stocks, electric elevators, etc.

GENERAL PERFORMANCE CRITERIA

- Conformity to plans and specifications
- Conformity to occupational health and safety standards
- Conformity to the signals code in force
- Proper use of tools and equipment
- Careful and clean work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret the work plan.
- Determine the centre of gravity and evaluate loads.

SPECIFIC PERFORMANCE CRITERIA

- Accurate interpretation
- Correct judgment
- Accurate observations and calculations

CONSTRUCTION ELECTRICITY

MODULE 14

CODE: 786-143

TITLE: HANDLING TOOLS AND MATERIALS AND RIGGING PARTS AND MACHINES

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Select suspension, lifting and handling equipment for a specific need.
- Check suspension and other equipment before use.
- Sling loads.
- Use crane operators' signals.
- Observe health and safety rules.
- Move a load on an inclined or a horizontal plane.
- Use various methods of fastening.
- Use equipment for drawing electrical and signal conductors into various types of conduits.
- Use equipment for working in hard-to-reach places.

SPECIFIC PERFORMANCE CRITERIA

- Appropriate choice of equipment in terms of lifting capacity and resistance to friction and corrosion
- Visual check
- Correct judgment
- Use of appropriate technique
- Correct signals
- Understanding and systematic use of protective measures
- Proper technique
- Accurate calculation of leverages
- Proper techniques of fastening cables and towing ropes
- Appropriate choice of equipment
- Proper use of equipment
- Use of techniques prescribed by the Safety Code

CONSTRUCTION ELECTRICITY

MODULE 14

CODE: 786-143

TITLE: HANDLING TOOLS AND MATERIALS AND RIGGING PARTS AND MACHINES

DURATION: 45 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To develop the ability to work as part of a team.
 - To adopt safe work practices.
 - To define safety factors in handling.
01. To define handling and rigging.
- Interpret the work plan.
02. To use the appropriate formulas for calculating weights and loads.
- Determine the centre of gravity and evaluate loads.
03. To describe handling equipment.
04. To describe suspension equipment.
- Select suspension, lifting and handling equipment for a specific need.
- Check suspension and other equipment before use.
05. To identify knots useful in handling.
06. To attach rope clips to cables, and stay and anchor them.
- Sling loads.
- Use crane operators' signals.
- Observe health and safety rules.
07. To identify the methods of moving loads on a horizontal plane and on an inclined plane.
- Move a load on an inclined or a horizontal plane.
- Use various methods of fastening.
- Use equipment for drawing electrical and signal conductors into various types of conduits.
- Use equipment for working in hard-to-reach places.
- TO HANDLE TOOLS AND MATERIALS AND TO RIG PARTS AND MACHINES.

CONSTRUCTION ELECTRICITY

MODULE 15

CODE: 786-153

TITLE: INSTALLING VERY LOW-VOLTAGE LAMPHOLDERS AND SWITCHES

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
install very low-voltage lampholders and switches
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working in teams of two
- On the basis of:
 - . specific instructions
 - . the Québec Electrical Code
 - . plans and specifications for electrical installations

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to plans and specifications
- Observance of manufacturers' standards
- Proper use of tools and accessories
- Conformity to the Québec Electrical Code
- Careful and clean work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret plans and specifications for electrical installations.
- Observe health and safety rules.
- Install and connect lampholders:
 - . surface-mounted
 - . flush-mounted

SPECIFIC PERFORMANCE CRITERIA

- Accurate interpretation of colour code and symbols
- Understanding and systematic use of protective measures
- Use of proper methods of handling, fastening and anchoring
- Use of proper methods of installing cable or conduit
- Use of proper methods of connecting conductors

CONSTRUCTION ELECTRICITY

MODULE 15

CODE: 786-153

TITLE: INSTALLING VERY LOW-VOLTAGE LAMPHOLDERS AND SWITCHES

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Test the operation of the installed lampholders.
- Interpret plans and specifications for very low-voltage switches.
- Install wiring for very low-voltage switches:
 - . two-wire and three-wire systems
 - . master switch
- Test the operation of the installed switches.
- Tidy the work area.

SPECIFIC PERFORMANCE CRITERIA

- Capacity of the mounting to bear stress
- Presence of main evaluation criteria
- Use of correct techniques
- Accurate interpretation of colour code and symbols
- Appropriate choice of accessories
- Use of proper techniques
- Presence of main evaluation criteria
- Use of correct techniques
- Cleanliness of work area and proper storage of equipment and supplies

CONSTRUCTION ELECTRICITY

MODULE 15

CODE: 786-153

TITLE: INSTALLING VERY LOW-VOLTAGE LAMPHOLDERS AND SWITCHES

DURATION: 45 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To adopt safe work practices.
 - To take pride in doing work well.
 - To use materials economically and handle equipment with care.
 - To act in accordance with professional ethics.
 - To quickly recognize a hazardous situation.
01. To identify the uses of lampholder systems.
02. To identify the characteristics of lampholders and to select mounting accessories.
- Interpret plans and specifications for electrical installations.**
03. To identify the steps in installing a lampholder system.
- Observe health and safety rules.**
04. To identify Québec Electrical Code standards for the fastening of a lampholder system.
05. To take measurements in order to determine where lampholders should be installed.
- Install and connect lampholders:**
- . surface-mounted
 - . flush-mounted
- Test the operation of the installed lampholders.**
06. To locate any malfunction in the lampholder system.
07. To identify the characteristics of very low-voltage switches and to select mounting accessories.
- Interpret plans and specifications for very low-voltage switches.**
08. To identify the steps in installing a switch system.
- Install wiring for very low-voltage switches:**
- . two-wire and three-wire systems
 - . master-switch
09. To identify Québec Electrical Code standards for the installation of a switch.
10. To locate any malfunction in the switch.
- Test the operation of the installed switches.**
- Tidy the work area.**
- TO INSTALL VERY LOW-VOLTAGE LAMPHOLDERS AND SWITCHES.**

CONSTRUCTION ELECTRICITY

MODULE 16

CODE: 786-165

TITLE: INSTALLING AND CONNECTING HEATING AND AIR-CONDITIONING SYSTEMS

DURATION: 75 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
install and connect heating and air-conditioning systems
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working in teams of two
- On the basis of:
 - . plans, diagrams, manufacturers' manuals
 - . specific instructions
- Using:
 - . baseboard heaters
 - . an electric warm-air heating system
 - . an oil warm-air heating system
 - . a heat pump

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to the Québec Electrical Code
- Conformity to the manufacturer's standards
- Proper method
- Proper operation of the system
- Clean work
- Neat finished appearance

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret plans, diagrams and manufacturers' manuals.

SPECIFIC PERFORMANCE CRITERIA

- Correct identification and location of all parts

CONSTRUCTION ELECTRICITY

MODULE 16

CODE: 786-165

TITLE: INSTALLING AND CONNECTING HEATING AND AIR-CONDITIONING SYSTEMS

DURATION: 75 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Plan the work.
- Observe health and safety rules.
- Install the equipment.
- Connect the system.
- Test the system.
- Diagnose problems in functioning.
- Perform preventive maintenance on the systems.

SPECIFIC PERFORMANCE CRITERIA

- Choice of appropriate tools, materials and equipment
- Good judgment
- Understanding and systematic use of protective measures
- Neat finished appearance
- Level positioning
- Good arrangement
- Accurate interpretation of the information supplied
- Conformity to the manufacturer's standards
- Conformity to the personal identification code based on that of the manufacturer
- Proper placement of connections
- Proper functioning of the equipment
- Proper functioning of safety devices
- Accurate diagnosis
- Appropriate problem-solving method
- Conformity to the manufacturer's standards
- Use of appropriate fluids

CONSTRUCTION ELECTRICITY

MODULE 16

CODE: 786-165

TITLE: INSTALLING AND CONNECTING HEATING AND AIR-CONDITIONING SYSTEMS

DURATION: 75 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To become aware of the importance of planning work well. 07. To revise the plans and/or the diagram, if necessary.

- To perform tasks with assurance and precision. Diagnose problems in functioning.

- To act in accordance with professional ethics. Perform preventive maintenance on the systems.

01. To know the principles, the operation and the control of heating and air-conditioning systems and their accessories. TO INSTALL AND CONNECT HEATING AND AIR-CONDITIONING SYSTEMS.

02. To identify the symbols used.

Interpret plans, diagrams and manufacturers' manuals.

03. To inspect the site.

Plan the work.

04. To identify and install conduit and wiring.

Observe health and safety rules.

Install the equipment.

05. To test the installation and make the necessary adjustments.

Connect the system.

06. To test the system as a whole, in simulation.

Test the system.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
install and connect single-phase and three-phase transformers
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working in teams of two
- On the basis of:
 - . plans, specifications, diagrams or sketches
 - . specific instructions
 - . the Québec Electrical Code and Hydro-Québec standards
- Using:
 - . three single-phase transformers on three-phase current
 - . the necessary equipment, tools and accessories

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Appropriate use of equipment and tools
- Proper handling of equipment
- Conformity to plans and specifications
- Conformity to the Québec Electrical Code and Hydro-Québec standards

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret plans and specifications for electrical installations.
- Determine where transformers are to be installed.
- Observe health and safety rules.

SPECIFIC PERFORMANCE CRITERIA

- Accurate interpretation of plans
- Understanding of specifications
- Conformity to Québec Electrical Code standards
- Understanding and systematic use of protective measures

CONSTRUCTION ELECTRICITY

MODULE 17

CODE: 786-173

TITLE: INSTALLING AND CONNECTING SINGLE-PHASE AND THREE-PHASE TRANSFORMERS

DURATION: 45 hours

FIRST-LEVEL OPERATIONAL OBJECTIVE BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Select, handle and install transformers.
- Do a polarity test of a transformer.
- Connect transformers:
 - . a step-up transformer
 - . a step-down transformer
 - . in parallel (2)
 - . in series (2)
 - . wye connection (3)
 - . delta connection (3)
- Connect a transformer as an autotransformer.
- Connect loads to transformers.
- Tidy and clean the work area.

SPECIFIC PERFORMANCE CRITERIA

- Good judgment
- Use of appropriate methods and techniques of handling, fastening and anchoring
- Accurate readings
- Correct connections
- Sustained attention
- Satisfactory installations
- Understanding and application of concepts related to alternating current
- Observance of safety measures
- Proper storage of materials, tools and equipment
- Cleanliness of the area

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To respect the physical and human environment.
 - To adopt safe work practices.
- TO INSTALL AND CONNECT SINGLE-PHASE AND THREE-PHASE TRANSFORMERS.

01. To describe the components of transformers.

Interpret plans and specifications for electrical installations.

Determine where transformers are to be installed.

Observe health and safety rules.

Select, handle and install transformers.

Do a polarity test of a transformer.

02. To identify transformer parameters.

Connect transformers:

- . a step-up transformer
- . a step-down transformer
- . in parallel (2)
- . in series (2)
- . wye connection (3)
- . delta connection (3)

Connect a transformer as an autotransformer.

03. To make special connections.

Connect a load to transformers.

04. To test the operation of transformers.

Tidy and clean the work area.

**TITLE: INSTALLING AND REPAIRING DC MOTORS AND GENERATORS
AND THEIR CONTROL CIRCUITS****DURATION: 75 hours****FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
install and repair DC motors and generators and their control circuits
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a plan and specifications
 - . a motor or generator with a real or simulated malfunction
 - . specific instructions
- Using:
 - . appropriate tools and equipment
 - . the necessary measuring instruments
 - . a partly finished installation

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to the Québec Electrical Code and Hydro-Québec standards
- Conformity to the manufacturer's standards
- Conformity to plans and specifications
- Proper method

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret the technical specifications of DC motors and generators.
- Explain the operating principles of DC motors and generators.

SPECIFIC PERFORMANCE CRITERIA

- Correct interpretation of technical parameters
- Understanding of the operating principles

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE**

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Observe health and safety rules.
- Connect different types of motors and generators.
- Connect controllers to DC machines.
- Install, test and start up a system consisting of:
 - . a motor
 - . a controller
 - . a switch
- Diagnose a malfunction.
- Maintain and repair the operating parts of an emf installation.

SPECIFIC PERFORMANCE CRITERIA

- Understanding and systematic use of protective measures
- Correct connections
- Correct location of connections, with and without plans
- Correct reading of connection plan (if available)
- Correct connections
- Correct location of connections, with and without plans
- Solid fastening and anchoring
- Use of proper method in mechanical and electrical tests of a static or dynamic system
- Correct procedure and accurate diagnosis
- Appropriate choice of solution
- Observance of maintenance schedules
- Return of system to normal operation

CONSTRUCTION ELECTRICITY

MODULE 18

CODE: 786-185

TITLE: **INSTALLING AND REPAIRING DC MOTORS AND GENERATORS
AND THEIR CONTROL CIRCUITS**

DURATION: 75 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To realize the importance of using the appropriate terminology.
 - To recognize defective components by sight, hearing, smell or touch.
 - To develop a sense of observation.
07. To describe the operating principle of reduced-voltage (manual) DC controllers.
08. To identify and differentiate magnetic and static reduced-voltage DC controllers on the basis of their operating principles.

Connect controllers to DC machines.

01. To identify and distinguish the components of DC generators.
02. To interpret the rating plate.
09. To identify the parameters for the installation of various motors.
10. To install the components.

Interpret the technical specifications of DC motors and generators.

03. To describe the operating principles of various types of generators:
- . shunt
 - . series
 - . compound
11. To test the electrical circuit and mechanical devices:
- . with the power off
 - . while running

Install, test and start up a system.

04. To identify the types of excitation.

Diagnose a malfunction.

Explain the operating principles of DC motors and generators.

Maintain and repair the operating parts of an emf installation.

Observe health and safety rules.

**TO INSTALL AND REPAIR DC MOTORS AND GENERATORS
AND THEIR CONTROL CIRCUITS**

Connect different types of motors and generators.

05. To explain the difference between a controller and a starter.

06. To identify the various control circuits.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
install and repair AC motors and generators and their control circuits
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a plan and specifications
 - . a motor or generator with a real or simulated malfunction
 - . specific instructions
- Using:
 - . the appropriate tools and equipment
 - . the necessary measuring instruments
 - . a partly finished installation

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to the Québec Electrical Code and Hydro-Québec standards
- Conformity to the manufacturer's standards
- Conformity to plans and specifications
- Proper method

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret the technical specifications of AC motors and generators.
- Explain the operating principles of AC motors and generators.

SPECIFIC PERFORMANCE CRITERIA

- Correct interpretation of the technical parameters
- Understanding of the operating principles

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Observe health and safety rules.
- Connect different types of motors and generators.
- Connect various types of full-voltage and single-phase and three-phase reduced-voltage controllers.
- Install, test and start up a system consisting of:
 - . a motor
 - . a controller
 - . a switch
- Diagnose a malfunction.
- Maintain and repair the operating parts of an emf installation.

SPECIFIC PERFORMANCE CRITERIA

- Understanding and systematic use of protective measures
- Correct connections
- Location of wires by means of instruments, with and without plans
- Correct connections
- Location of components with and without plans
- Proper functioning
- Solid fastening and anchoring
- Use of proper method in mechanical and electrical tests of a static or dynamic system
- Correct procedure
- Accurate diagnosis
- Appropriate choice of solution
- Observance of maintenance schedules
- Return of the system to normal operation

CONSTRUCTION ELECTRICITY

MODULE 19

**TITLE: INSTALLING AND REPAIRING AC MOTORS AND GENERATORS
AND THEIR CONTROL CIRCUITS**

CODE: 786-195

DURATION: 75 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To realize the importance of using the appropriate terminology.
 - To recognize defective components by sight, hearing, smell or touch.
 - To develop a sense of observation.
01. To identify the various parts of AC motors and generators.
02. To classify the various alternating current motors and generators.
- Interpret the technical specifications of AC motors and generators.
03. To describe the operating principles of single-phase and three-phase AC generators.
04. To describe the operating principles of single-phase and three-phase AC motors.
05. To identify and differentiate various types of AC motors.
- Explain the operating principles of AC motors and generators.
- Observe health and safety rules.
- Connect different types of motors and generators.
06. To identify the various types of switches.
07. To describe the operating principles of controllers.
- Connect various types of full-voltage and single-phase and three-phase reduced-voltage controllers.
08. To install the components.
09. To carry out electrical and mechanical tests.
- Install, test and start up a system consisting of:
- . a motor
 - . a controller
 - . a switch
- Diagnose a malfunction.
- Maintain and repair the operating parts of an emf installation.
10. To identify the parameters of an emf installation.
- TO INSTALL AND REPAIR AC MOTORS AND GENERATORS AND THEIR CONTROL CIRCUITS.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
apply electronics concepts
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a schematic diagram
 - . specific instructions
 - . the appropriate manuals
- Using the necessary equipment and tools

GENERAL PERFORMANCE CRITERIA

- Proper technique in using measuring instruments
- Conformity to the teacher's instructions
- Proper method
- Careful, meticulous work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Identify the various symbols.
- Use diodes in simple rectifier circuits.
- Assemble a basic power supply regulated by a zener diode.
- Do a simple installation with bipolar transistors.

SPECIFIC PERFORMANCE CRITERIA

- Conformity to the manufacturer's standards
- Clear understanding of circuits
- Conformity to the diagram
- Accurate measurements
- Proper form of curves
- Accurate test of components:
 - . correct identification of basic configurations
 - . functional operation of circuits

CONSTRUCTION ELECTRICITY

MODULE 20

CODE: 786-205

TITLE: APPLYING ELECTRONICS CONCEPTS

DURATION: 75 hours

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE**

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

- Explain the operation of thyristors.

- Understanding of the operating principles.

CONSTRUCTION ELECTRICITY

MODULE 20

TITLE: APPLYING ELECTRONICS CONCEPTS

CODE: 786-205

DURATION: 75 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To learn to work with care and attention to detail.
- To draw sketches and diagrams.
- To recognize the smell of an overheated part.

Identify the various symbols.

01. To describe the operation of a diode.

02. To use an ohmmeter to test a diode.

03. To explain the principles of basic rectifier circuits.

Use diodes in simple rectifier circuits.

04. To explain the components of a power supply.

05. To test and measure the components.

Assemble a basic power supply regulated by a zener diode.

06. To describe the operating principle of bipolar transistors.

07. To explain the basic configurations of amplifiers.

Do a simple mounting with bipolar transistors.

Explain the operation of thyristors.

TO APPLY ELECTRONICS CONCEPTS.

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must use combinational logic in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- Based on:
 - . specific instructions
 - . logic functions
 - . Boolean expressions (maximum 4 variables)
- Using:
 - . electronic and pneumatic equipment
 - . the appropriate tools and instruments
 - . plans and worksheets

GENERAL PERFORMANCE CRITERIA

- Careful handling of equipment
- Use of correct method
- Correct answers
- Conformity of the circuits to the equations

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Convert numbers into binary, octal and hexadecimal number systems.
- Construct truth tables for logic functions.
- Simplify logic equations, using Boolean algebra and Karnaugh mapping.

SPECIFIC PERFORMANCE CRITERIA

- Correct use of the rules for conversion
- Accuracy of tables
- Maximum simplification of equations

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

- | | |
|--|---|
| <ul style="list-style-type: none">- Diagram the logic circuit of a Boolean expression.
- Construct a logic circuit:<ul style="list-style-type: none">. with electronic components. with pneumatic components | <ul style="list-style-type: none">- Use of correct symbols and conventions
- Conformity to the diagram- Functional operation of the circuit- Neat appearance- Tight connections |
|--|---|

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To observe occupational health and safety rules, particularly those concerning the use of compressed air.

08. To interpret and verify the characteristics of logic gates in electronics and pneumatics.

- To take care that circuits and diagrams are clear and well laid out.

Construct a logic circuit:
 . with electronic components
 . with pneumatic components

01. To identify the number systems.

02. To distinguish BCD codes.

TO USE COMBINATIONAL LOGIC.

Convert numbers into binary, octal and hexadecimal number systems.

03. To identify logic functions and their symbols.

Construct truth tables for logic functions.

04. To describe the laws of Boolean algebra.

05. To simplify an equation, using Boolean algebra.

06. To interpret a Karnaugh rectangle.

07. To simplify an equation, using a Karnaugh rectangle.

Simplify logic equations, using Boolean algebra and Karnaugh mapping.

Diagram the logic circuit of a Boolean expression.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
apply welding techniques used in the trade
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- Based on:
 - . a plan or a sketch with symbols
 - . tables, diagrams and charts
- Using:
 - . a combination cutting and welding torch
 - . filler rods of bronze and mild steel
 - . metal parts of mild steel (not prepared), such as plates (1/16" to 1/2"), pipes (2" to 4"), angle irons (1" to 3"), sections (2" to 4")
 - . the appropriate mountings
 - . the necessary tools, equipment and accessories
 - . the necessary safety equipment
- According to the established standards

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Proper method
- Clean, careful work
- Concern for the quality/cost ratio
- Mastery of technique
- Correct use of appropriate tools and equipment
- Quality of welds
- Result: conformity to requirements

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Interpret the work plan.

SPECIFIC PERFORMANCE CRITERIA

- Accurate interpretation of symbols

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Observe health and safety rules.
- Prepare plates, sections and tubes.
- Set up welding equipment:
 - . oxyacetylene welding machine
 - . arc welding machine
- Select filler rods.
- Select electrodes (arc welding).
- Make welds in metals in the flat position, using:
 - . regular welding
 - . braze welding
- Make cuts in metals in the horizontal and vertical positions, using oxygen cutting techniques.
- Make welds in metals, using an arc welding machine:
 - . tack welds in four positions
 - . welds in the flat position
- Clean the welds and cuts.

SPECIFIC PERFORMANCE CRITERIA

- Understanding and systematic use of protective measures
- Correct dimensions
- Cleanliness
- Correct angles
- Proper setup
- Appropriate choice of accessories
- Proper adjustment of pressures and parameters
- Appropriate choice of type and diameter
- Appropriate choice of:
 - . type
 - . number
 - . diameter
- Conformity to the plan or sketch
- Proper methods
- Correct use of techniques
- Proper methods
- Correct use of techniques
- Proper methods
- Correct use of techniques
- Conformity to safety standards
- Correct use of tools
- Clean welds

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Visually evaluate welds and cuts.
- Observe welding techniques used in thermit welding (cadweld).
- Tidy the work area.

SPECIFIC PERFORMANCE CRITERIA

- Presence of the main criteria for evaluation
- Precise description of techniques and procedures
- Proper storage of welding machine, equipment and tools
- Cleanliness of the work area

CONSTRUCTION ELECTRICITY

MODULE 22

CODE: 786-223

TITLE: APPLYING WELDING TECHNIQUES

DURATION: 45 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

01. To identify the symbols used in welding.

Interpret the work plan.

02. To describe the protective measures applicable to welding.

Observe health and safety rules.

03. To list the steps in preparing plates.

Prepare plates, sections and tubes.

04. To describe the hazards of using oxyacetylene and electric arc welding machines.

05. To list the steps in turning on a welding machine.

06. To explain how to adjust a welding machine.

07. To describe the gases used in oxyacetylene welding.

Set up welding equipment:

- . oxyacetylene welding machine
- . arc welding machine

08. To identify the types of filler rods.

09. To identify the main types of electrodes.

Select filler rods.

Select electrodes (arc welding).

10. To identify the various types of flux and filler metals used in brazing.

11. To explain the technique and procedure used in:
. welding
. braze welding

12. To describe the factors that must be controlled when welding.

Make welds in metals in the flat position, using:
. regular welding
. braze welding

Make cuts in metals in the horizontal position and the vertical position, using oxygen cutting.

13. To describe the importance of tack welding.

Make welds in metals using arc welding:
. tack welds in four positions
. welds in the flat position

Clean the welds and cuts.

14. To describe the characteristics of a good weld.

15. To describe the causes of defects in welding, and their solutions.

Visually evaluate welds and cuts.

16. To describe the principles of thermit welding (cadweld).

CONSTRUCTION ELECTRICITY

MODULE 22

TITLE: APPLYING WELDING TECHNIQUES

CODE: 786-223

DURATION: 45 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

Observe the welding techniques used in thermit welding (cadweld).

Tidy the work area.

TO APPLY WELDING TECHNIQUES USED IN THE TRADE.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
use sequential logic
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- Based on:
 - . plans for a system or an installation
 - . specific instructions
- Using:
 - . electric or pneumatic logic components
 - . appropriate tools and instruments
 - . cabling materials
 - . mounting panels

GENERAL PERFORMANCE CRITERIA

- Accurate interpretation of symbols
- Observance of parameters when turning circuit on
- Operation in accordance with plans and instructions
- Respect for the equipment

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- State the roles of the various logic components:
 - . electronic
 - . pneumatic
 - . electro-pneumatic
 - . electro-hydraulic

SPECIFIC PERFORMANCE CRITERIA

- Correct association of each component with its role
- Correct identification of components

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Explain the operating principles of a flip-flop and of a sequencer.
- Solve a simple problem by means of grafcet and by means of a ladder diagram.
- Wire a basic circuit.

SPECIFIC PERFORMANCE CRITERIA

- Satisfactory understanding of the operating principles
- Proper procedure
- Accurate solution proposed
- Correct wiring
- Functional operation of the circuit

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To handle equipment with care. TO USE SEQUENTIAL LOGIC.

- To take care that circuits and diagrams are clear and well laid out.

- To visually detect malfunctions.

01. To identify sequential logic symbols.

02. To identify components.

03. To identify electro-pneumatic components.

04. To identify electro-hydraulic components.

State the roles of the various logic components:

- . electronic**
- . pneumatic**
- . electro-pneumatic**
- . electro-hydraulic**

Explain the operating principles of a flip-flop and of a sequencer.

05. To describe the elements of a grafcet.

06. To use the cascade method to solve a simple problem.

07. To create ladder diagrams.

Solve a simple problem by means of grafcet and by means of a ladder diagram.

Wire a basic circuit.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE**

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
install and connect alarm and warning systems
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a diagram and notes from the manufacturer
 - . a zoned warning system
 - . a sensor circuit/signal circuit
- Using the necessary instruments and tools

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to the Québec Electrical Code and the Building Code
- Conformity to plans and diagrams
- Conformity to the manufacturer's standards
- Proper method
- Result: proper operation of system

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Read and interpret diagrams of alarm and warning systems.
- Observe health and safety rules.
- Install the components of an alarm and/or warning system.
- Wire sensor and signal circuits.

SPECIFIC PERFORMANCE CRITERIA

- Accurate interpretation of symbols and conductor colour codes
- Understanding and systematic use of protective measures
- Conformity to the plan
- Use of proper technique

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Connect sensor and signal circuits.
- Perform preliminary tests.
- Locate a malfunction.
- Connect circuits to a test board.
- Test the operation of the overall system.

SPECIFIC PERFORMANCE CRITERIA

- Correct polarities (signal circuit)
- Appropriate choice of tools
- Location of problem by means of measuring instruments
- Proper operation of system
- Correct testing procedure
- Proper operation of system

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To recognize the colours used for the identification codes. **TO INSTALL AND CONNECT ALARM AND WARNING SYSTEMS.**

- To recognize defective components by sight, smell or touch.

- To develop the habit of keeping the work area clean and taking good care of tools and equipment.

01. To describe alarm and warning systems and their components.

02. To know how the various systems work.

Read and interpret diagrams of alarm and warning systems.

Observe health and safety rules.

Install the components of an alarm and/or warning system.

Wire sensor and signal circuits.

Connect sensor and signal circuits.

03. To describe the specific preliminary tests.

Perform preliminary tests.

Connect circuits to a test board.

Test the operation of the overall system.

Locate a malfunction.

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
install and connect a programmable controller
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . an installation plan and specifications
 - . specific instructions
- Using:
 - . the appropriate equipment
 - . tools and fastening devices in keeping with the manufacturer's standards

GENERAL PERFORMANCE CRITERIA

- Observance of occupational health and safety rules
- Conformity to plans and specifications
- Proper method
- Respect for materials
- Clean, careful work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Identify the components of a programmable controller.
- Describe and diagram the operating principle of a programmable controller.
- Interpret control diagrams.

SPECIFIC PERFORMANCE CRITERIA

- Accurate identification of components
- Satisfactory understanding of operating principles
- Accurate diagram
- Accurate association of diagram and controller

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Install a programmable controller.
- Connect input and output terminals and start up the system.

SPECIFIC PERFORMANCE CRITERIA

- Solid fastenings
- Conformity to plans and specifications
- Correct, neat connections
- Correct placement of connections
- Proper starting procedure
- Precautions regarding power actuators

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To keep the work area clean and take good care of equipment.
- To develop the ability to associate elements of a plan with physical entities.

Identify the components of a programmable controller.

Describe and diagram the operating principle of a programmable controller.

Interpret control diagrams.

Install a programmable controller.

01. To identify input and output modules.

Connect input and output terminals and start up the system.

TO INSTALL AND CONNECT A PROGRAMMABLE CONTROLLER.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
install and connect a control panel
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Work in two- or three-member teams
- A real or simulated situation
- On the basis of:
 - . plans and specifications
 - . specific instructions
- Using:
 - . the Québec Electrical Code
 - . appropriate materials and equipment
 - . protective equipment

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to plans, specifications and instructions
- Proper techniques in using measuring instruments
- Concern for costs and respect for materials and tools
- Concern for the quality of work
- Result: proper operation of system

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Identify the stages of the work.
- Interpret the plans and specifications.

SPECIFIC PERFORMANCE CRITERIA

- Accurate identification
- Correct interpretation of specifications
- Understanding of the system's sequence of operations

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Observe health and safety rules.
- Install and connect the equipment.
- Test and start the equipment.
- Clean up the work area.

SPECIFIC PERFORMANCE CRITERIA

- Understanding and systematic use of protective measures
- Solid fastenings
- Functional arrangement of components
- Proper placement of connections
- Correct testing procedure
- Proper operation of system
- Cleanliness of the area

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To use materials economically and handle equipment with care.
- To learn to work as part of a team.
- To be concerned about the proper operation of the system.

Identify the stages of the work.

Interpret the plans and specifications.

Observe health and safety rules.

01. To modify the basic circuit to meet new needs, if necessary.

02. To identify the conductors.

03. To examine the immediate area.

Install and connect the equipment.

Test and start the equipment.

Clean up the work area.

TO INSTALL AND CONNECT A CONTROL PANEL.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE****EXPECTED BEHAVIOUR**

To demonstrate the required competency, the students must
apply ecological concepts
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . specific instructions
 - . a simulated situation (theoretical)

GENERAL PERFORMANCE CRITERIA

- Understanding of the harmful environmental effects of pollutants
- Accurate identification of the principal pollutants

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Describe the characteristics and principles of "soft" energy.
- Identify the various pollutants encountered on the job.
- Identify work situations where pollutants are encountered.
- Identify the safety measures related to pollutants.

SPECIFIC PERFORMANCE CRITERIA

- Understanding of the principles and their possible applications
- Correct interpretation of symbols
- Identification of their particular properties
- Clear understanding of their effects on the human body and the environment
- Correct association of various pollutants with specific work situations
- Correct association of personal and environmental protective measures with the harmful effects of specific pollutants

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

- Identify the methods of disposing of pollutants.

- Correct association of ecological disposal methods with the hazards of specific pollutants

CONSTRUCTION ELECTRICITY

MODULE 27

TITLE: APPLYING ECOLOGICAL CONCEPTS

CODE: 786-271

DURATION: 15 hours

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

- To become aware of the importance of protection against the hazards of pollutants.
- To become aware of the importance of environmental protection.

Describe the characteristics and principles of "soft" energy.

Identify the various pollutants encountered on the job.

Identify work situations where pollutants are encountered.

Identify the safety measures related to pollutants.

Identify the methods of disposing of pollutants.

TO APPLY ECOLOGICAL CONCEPTS.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
SITUATIONAL OBJECTIVE**

EXPECTED OUTCOME

By participating in the required activities of the learning context according to the indicated criteria, the students will
prepare for a creative job search.

SPECIFICATIONS

During this module, the students will:

- Identify the steps in planning a job search.
- Gather the information needed to prepare a curriculum vitae.
- Identify appropriate and inappropriate attitudes and behaviour at a job interview.

LEARNING CONTEXT

Outline of student activities:

PHASE I: Planning a job search

- Identifying the steps in a job search: targeting companies, telephoning them, writing a letter of introduction and a résumé, requesting an interview, going through an interview, and following up.
- Establishing a hypothetical timetable allotting time for each step of the job search.

PARTICIPATION CRITERIA

The students must:

PHASE I

- Establish a realistic timetable that includes all the steps of a hypothetical job search.

FIRST-LEVEL OPERATIONAL OBJECTIVE
SITUATIONAL OBJECTIVE

LEARNING CONTEXT

PARTICIPATION CRITERIA

PHASE II: The application

PHASE II:

- Identifying the elements that make up a letter of introduction and a résumé.
- Identifying attitudes and behaviour appropriate in an interview.
- Identifying ways of following up a job application.

- Take part in a group discussion on the information to include and to omit in a résumé and a letter of introduction, and the attitudes and behaviour to adopt and to avoid in a job interview.

PHASE III: Self-evaluation

PHASE III:

- Identifying individual strengths and weaknesses in each step of the job search, and discussing them in a group meeting.

- Take part in a group discussion on their strengths and weaknesses in the job search, and ways they can improve themselves.

INSTRUCTIONAL GUIDELINES

The teacher will:

- Provide the students with all pertinent literature, such as a list of employers, samples of letters of introduction and résumés, and computer programs on job search techniques.
- Ensure that students realize the importance of being well-prepared for a job search.

SECOND-LEVEL OPERATIONAL OBJECTIVES

IN ORDER TO ACHIEVE THE FIRST-LEVEL OBJECTIVE, THE STUDENTS SHOULD HAVE PREVIOUSLY ATTAINED SECOND-LEVEL OBJECTIVES, SUCH AS:

01. To identify the resources and services available to aid in a job search, such as employment centres, newspapers and the employment services of educational institutions.
02. To identify practical tools for information-gathering, such as file cards (for telephone calls), timetables and appointment books.
- TO PREPARE FOR A CREATIVE JOB SEARCH.

Phase I: Planning a job search

03. To identify the information needed for a résumé.
04. To identify the papers that should accompany a résumé (e.g. transcripts, letters from former employers, letters of reference).
05. To realize the importance of communicating well in speech and writing.

Phase II: The application

06. To realize the importance of using effective tools and proven methods when looking for a job.
07. To realize the importance of a positive attitude when looking for a job.
08. To know how to sell themselves.

Phase III: Self-evaluation

APPENDICES

APPENDIX A: GRID OF LEARNING FOCUSES

COMPETENCIES (directly related to the practice of the specific trade)			WORK PROCESS (major steps)								COMPETENCIES of a fundamental nature (technology, personal development, etc.)															TOTALS			
CONSTRUCTION ELECTRICITY	FIRST - LEVEL OPERATIONAL OBJECTIVES	DURATION (IN HOURS)	Read and interpret plans and follow instructions	Plan work	Observe safety rules	Set up the work (handling and rigging)	Carry out the work	Test and turn on equipment	Clean up the work area	Fill out work reports	Observe health and safety rules	Use tools, equipment and fastening devices	Gain a general knowledge of types of construction sites, equipment and organizations	Analyse direct current circuits	Interpret and apply the Québec Electrical Code and Hydro - Québec standards	Read and interpret plans and specifications	Install cable and conduit	Plan work and solve problems	Analyse alternating current circuits	Draw sketches and diagrams	Handle tools and materials and rig parts and machinery	Apply electronics concepts	Apply combinational logic	Apply welding techniques used in the trade	Apply sequential logic	Apply ecological concepts	Prepare for a creative job search	NUMBER	DURATION (IN HOURS)
	FIRST - LEVEL OPERATIONAL OBJECTIVES										B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	S	17	
	DURATION (IN HOURS)										30	30	60	90	30	45	60	30	75	30	45	75	45	45	30	15	15		750
	Determine one's suitability for the trade and the training	S1	30										○														○		
	Install and modify circuits for lighting and receptacles	B1	45	▲	▲	▲	△	▲	▲	▲	△	●	●		●	●	●	○	○	○	●	○				○			
	Install low - voltage service entrances	B2	60	▲	▲	▲	▲	▲	▲	▲	▲	●	●			●	●	●	●	○	○	○			○		○		
	Install very low - voltage lampholders and switches	B2	45	▲	▲	▲	▲	▲	▲	▲	▲	●	○		○	●	●	○	○	○	○	○	○		○	○	○		
	Install and connect heating and air - conditioning systems	B2	75	▲	▲	▲	▲	▲	▲	▲	▲	●	●		○	●	●	○	●	●	●	○	○	○	○	○	○		
	Install and connect single - phase and three - phase transformers	B2	45	▲	▲	▲	▲	▲	▲	▲	▲	●	○			●	●	○	●	●	○	○	○	○	○	○			
	Install and repair DC motors and generators and their control circuits	B2	75	▲	▲	▲	▲	▲	▲	▲	▲	●	○		●	●	●	○	○	○	○	○	○	○	○	○			
Install and repair AC motors and generators and their control circuits	B3	75	▲	▲	▲	▲	▲	▲	▲	▲	●	○		○	●	●	○	○	○	○	○	○	○	○	○				
Install and connect alarm and warning systems	B3	45	▲	▲	▲	△	▲	▲	▲	▲	●	○		○	●	●	○	○	○	○	○	○			○	○			
Install and connect a programmable controller	B3	45	▲	▲	▲	△	▲	▲	▲	▲	●	○		○	○	●	○	○	○	○	○	○	○	○	○				
Install and connect a control panel	B3	60	▲	▲	▲	▲	▲	▲	▲	▲	●	●		○	●	●	○	○	○	○	○	○	○	○	○				
NUMBER	11																											28	
DURATION (IN HOURS)		600																										1350	

S: Situational objective
B: Behavioural objective

△ Correlation between step and specific competency
▲ Correlation to be taught and evaluated

○ Correlation between a fundamental and a specific competency
● Correlation to be taught and evaluated

**HOW TO READ
BEHAVIOURAL OBJECTIVES**

EXPECTED BEHAVIOUR

Under this heading is the major statement of the objective outlining the performance to be achieved and the result to be attained by the students at the end of the module. The wording is identical to that in the grid of learning focuses.

CONDITIONS FOR PERFORMANCE EVALUATION

The information under this heading is designed to ensure that evaluation is the same wherever and whenever the program is taught, by listing what is necessary, useful and permissible.

GENERAL PERFORMANCE CRITERIA

The requirements by which to judge whether or not the expected behaviour is satisfactory are listed under this heading.

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

In order to ensure that the objective is clearly understood, this section outlines the major steps in attaining the expected behaviour.

SPECIFIC PERFORMANCE CRITERIA

Specific criteria are usually given for each of the specifications of behaviour. They ensure a more complete and enlightened decision on the attainment of the objective.

FIELD OF APPLICATION

Some objectives can apply to more than one task, occupation or field. In such cases, the range of applications is indicated under this heading.

FIRST-LEVEL OPERATIONAL OBJECTIVE
BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must
install and connect alarm and warning systems
in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Individually
- On the basis of:
 - . a diagram and notes from the manufacturer
 - . a zoned warning system
 - . a sensor circuit/signal circuit
- Using the necessary instruments and tools

GENERAL PERFORMANCE CRITERIA

- Conformity to occupational health and safety standards
- Conformity to the Québec Electrical Code and the Building Code
- Conformity to plans and diagrams
- Conformity to the manufacturer's standards
- Proper method
- Result: proper operation of system

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- Read and interpret diagrams of alarm and warning systems.
- Observe health and safety rules.
- Install the components of an alarm and/or warning system.
- Wire sensor and signal circuits.

SPECIFIC PERFORMANCE CRITERIA

- Accurate interpretation of symbols and conductor colour codes
- Understanding and systematic use of protective measures
- Conformity to the plan
- Use of proper technique

HOW TO READ
SITUATIONAL OBJECTIVES

EXPECTED OUTCOME

Under this heading, the major statement of the objective identifies the competency to be acquired by the end of the module. The wording is identical to that in the grid of learning focuses.

SPECIFICATIONS

Listed under this heading are details which provide a better understanding of the expected outcome.

LEARNING CONTEXT

This is an outline of the learning situation designed to help the students develop the required competencies. It is divided into distinct phases, such as information, involvement and self-evaluation.

PARTICIPATION CRITERIA

Listed under this heading are requirements the students must fulfill, usually related to each phase of the learning context. They focus on how the students take part in the activities rather than on the results obtained.

INSTRUCTIONAL GUIDELINES

Outlined under this heading are general directions to be followed and particular means to be used in teaching the program, so that the same requirements can apply wherever and whenever it is taught.

**FIRST-LEVEL OPERATIONAL OBJECTIVE
SITUATIONAL OBJECTIVE****EXPECTED OUTCOME**

By participating in the required activities of the learning context according to the indicated criteria, the students will
prepare for a creative job search.

SPECIFICATIONS

During this module, the students will:

- Identify the steps in planning a job search.
- Gather the information needed to prepare a curriculum vitae.
- Identify appropriate and inappropriate attitudes and behaviour at a job interview.

LEARNING CONTEXT

Outline of student activities:

PHASE I: Planning a job search

- Identifying the steps in a job search: targeting companies, telephoning them, writing a letter of introduction and a résumé, requesting an interview, going through an interview, and following up.
- Establishing a hypothetical timetable allotting time for each step of the job search.

PARTICIPATION CRITERIA

The students must:

PHASE I

- Establish a realistic timetable that includes all the steps of a hypothetical job search.

APPENDIX D

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