

## PLUMBER

### PROGRAM OBJECTIVES

The Plumber program at Eastern College, is designed to provide students with the high quality training necessary to start their career in the Plumber trade. Students will have the opportunity to combine classroom learning with the application of the skills in a shop setting.

The objective of this program is to prepare students with the skills necessary to gain employment in their trade. Instruction provided by industry experts ensures a balance between classroom theory and shop application. This means you will read and study how to do a job and then actually apply the skills in a shop setting.

Students will develop skills in hand and power tools, piping, potable water supply, rough-in plumbing, venting, hot water boilers, sewage systems, drainage piping, plumbing fixtures, gas-fitting basics, blueprint reading and plumbing code.

Students will complete an industry work term of four weeks as part of their program and will be evaluated by the journey person/mentor during the work term.

### CAREER OPPORTUNITIES

Graduates of the Plumber Program are entering the field at a time when industry demand is high and Atlantic Canada is experiencing strong growth. Graduates will have opportunities for employment in residential and commercial construction, maintenance departments in commercial, manufacturing and public facilities, plumbing maintenance companies and plumbing supply businesses.

Following graduation from the program those graduates who go on to complete apprenticeship and obtain a Certificate of Qualification with Red Seal will have opportunities for project supervision and/or management and even self-employment.

### PREREQUISITES

- High School Diploma or
- Mature student status or
- Adult High School Diploma or
- High School equivalency (GED)

### GRADUATION REQUIREMENTS

A student must obtain an overall grade, in each module of at least 70% in order to graduate and receive a diploma. A student must complete all requirements of the Student Success Strategies and Career Planning and Preparation modules as well as the field placement requirements.

### APPRENTICESHIP AND OCCUPATIONAL CERTIFICATION

Plumber is an apprenticeship trade in New Brunswick and compulsory. This means that people working in the trade are required to be registered apprentices or holders of a Certificate of Qualification (CQ) in the Plumber trade.

Graduates of this program may qualify for credit toward their apprenticeship upon registering as an apprentice with their trade employer and Apprenticeship and Occupational Certification, Government of New Brunswick. Graduates may also be eligible to challenge the apprenticeship level one exam and upon successful completion of that exam and meeting the on the job requirements for their trade will become second year apprentices.

Please see the Federal Government web-site: [www.servicecanada.gc.ca/en/gov/apprenticeship.htm](http://www.servicecanada.gc.ca/en/gov/apprenticeship.htm) for information on how to receive a government of Canada Apprentice Incentive Grant (AIG) of \$1000.00 for completion of level one of apprenticeship (includes both exam and on the job requirements), and for information on how to receive another \$1000.00 grant for completion of level two of apprenticeship.

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## PROGRAM MODULES

Student Success Strategies\*  
 Career Planning and Preparation I\*  
 Career Planning and Preparation II for Trades  
 Software Lab: Computer Fundamentals\*  
 Safe Work Practices  
 WHMIS  
 Introduction and Definitions  
 Hand and Power Tools  
 Explosive Actuated Tools  
 Iron Pipe and Fittings  
 Copper Tube, Tubing and Fittings  
 Welded and Flanged Piping  
 Plastic and Pipe Fittings  
 Cast Iron, Fibreglass, Glass, Lead and Historic Piping  
 Pipe Hangers  
 Valves  
 Introduction to Plumbing – Single Family Dwelling  
 Building Drains, Sewers, and Vents  
 Fixture Traps, Floor Drains, Cleanouts and Manholes  
 Plumbing Fixtures  
 The Water Supply System  
 Boilers and Trim  
 Hot Water Heating Systems  
 Heat Emissions Units  
 Introduction to Gasfitting Fundamentals

Introduction to Gasfitting Codes and Regulations  
 Properties of Gases and Principles of Combustion  
 Measurement and Calculation of Pressure Drop  
 Natural Draft Burner Adjustments and Gas Consumption  
 Introduction to Oxyacetylene Equipment and Rigging  
 Applied Mathematics  
 Perimeters, Areas, Percentage and Grade  
 Temperature and Heat  
 Matter, Density and Relative Density  
 Pressure and Atmosphere  
 Transfer of Heat and the Effects of Heat  
 Introduction to Sketching and Drawing  
 Blueprint Interpretation  
 Introduction to Code  
 Vents and Roof Terminals  
 Plumber Apprenticeship Training Program Orientation  
 Work Placement

<b>Theory</b>	<b>560 hours</b>
<b>Practical</b>	<b>480 hours</b>
<b>Work Term</b>	<b>160 hours</b>
<b>Total Hours</b>	<b>1200 hours</b>
<b>Total Weeks</b>	<b>32 weeks</b>

\*4 hours/day, all other classes are full days.

## MODULE DESCRIPTIONS

### **Student Success Strategies**

In this orientation module, emphasis is placed on thinking about achieving success from Day One. This module stresses the importance of developing non-technical skills to enhance personal, academic, and career success. This includes understanding learning styles and honing practical study skills, such as memory, reading, writing, note-and test-taking techniques. Personal exercises will focus on teamwork, decision making and problem solving skills, setting SMART goals and maintaining a positive attitude; techniques for managing change, money, stress and conflict will also be explored.

### **Career Planning and Preparation Level I**

This module introduces tools for planning and preparing for a successful job search, so that students can maintain a career-focused approach throughout their education program. Students will learn about the "Hidden" Job Market and ways to access it in their upcoming job search, how to research opportunities and network for industry contacts, and use appropriate etiquette when communicating with prospective employers. Students will identify their personal skills, values and preferences for the workplace, begin preparation of a professional resume and references, and organize proof documents for their career portfolio. Class discussions on various self-management topics introduced

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in Student Success Strategies will round out this module, which is a pre-requisite for Career Planning and Preparation - Level II.

### **Career Planning and Preparation Level II for Trades**

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This module continues to build on the concepts and skills introduced in Career Planning and Preparation - Level I. Students will identify and practice the different types and forms of interviews, practice responding to typical questions, and practice follow-up, evaluation and negotiation techniques they can use to ensure success. Students also practice the customer service and interpersonal skills necessary for success in today's business environment, with focus on oral and written techniques that ensure effective business communication.

### **Software Lab: Computer Fundamentals**

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Through a combination of theory and hands-on-practice, this module examines the role and use of the computer in today's workplace. Emphasis is placed on those computers outfitted with the Microsoft Windows operating system. Students will review basic computer concepts, Windows OS usage, and complete hands-on training exercises in business-standard software applications, including Microsoft Outlook and Microsoft Word. Keyboarding skills are also honed via daily keyboarding exercises and drills.

### **Safe Work Practices**

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As an apprentice and trades person, you must constantly be on the alert for possible injury situations. Statistics show that over 50% of the accidents involving young workers occur during the first six months on the job. Plumbers are exposed to a great variety of hazards and should therefore know how to locate and interpret sections of the Workers Compensation Act and the Occupational Health and Safety Act.

### **WHMIS**

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The WHMIS system applies to products that are deemed to be hazardous to the health of workers. WHMIS applies only to products, materials or substances that are imported into or sold in Canada.

WHMIS was designed with three goals in mind:

- To protect the worker by providing information on hazardous material being used
- To ensure that all hazardous materials used in the workplace are properly identified
- To ensure that the requirements for information on hazardous material are consistent across Canada

### **Introduction and Definitions**

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Hot water or *hydronic* heating is a component of both the plumbing and steamfitting – pipefitting industries. The steamfitter-pipefitter trade is very close in scope to that of the plumber. An introduction to the *Trade Regulation* governing the steamfitter – pipefitter trade is provided in this module to demonstrate the overlap in trade activities relating to hot water heating. Basic hot water heating terminology, heating components and heat transfer theory utilised within a single-family dwelling using baseboard cabinet or radiators will be examined.

### **Hand and Power Tools**

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Hand and power tools used in the plumbing trade range from gripping tools for pipe installations to power threading equipment for making threads for the fabrication of pipe systems. This module provides information on the selection, safe and proper use and care of common hand and power tools used in the plumbing trade.

### **Explosive Actuated Tools**

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Explosive actuated fastening makes drilling, chipping and plugging of concrete, drilling and bolting of steel unnecessary. The system is completely portable and requires no external power source. Fastenings can be made

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quickly and at lower costs than most other fastening methods. This module will enable you to describe the safe operation and demonstrate the safe use of explosive actuated tools.

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### **Iron Pipe and Fittings**

Iron/ferrous pipe and fittings used in the piping trade range from small-sized threaded iron pipe and fitting installations to large, exotic, welded alloy pipe systems. This module discusses the selection, safe and proper use and care of the most common iron/ferrous pipe and fittings used in the piping trade.

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### **Copper Tube, Tubing and Fittings**

Copper tube, tubing and fittings used in the piping trade range from small size copper tubing and fitting installations to large copper tube soldered systems. This module discusses the selection, safe and proper use and care of the more common copper tube, tubing and fittings used in the piping trade. This module will enable you to describe, install and service non-ferrous metal pipe and fittings.

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### **Welded and Flanged Piping**

Welded and flanged pipe and fittings used in the piping trade range from small size socket weld iron pipe and fitting installations to larger welded exotic alloy pipe systems to plastic piping systems. This module discusses the selection, safe and proper use and care of the most common welded and flanged pipe and fittings used with iron pipe in the piping trade.

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### **Plastic Pipe and Fittings**

Since its introduction, plastic pipe and fittings have gained a respectable share of the pipe trades market and are now used in a wide variety of piping applications. Plastic and fittings used in the piping trade range from small size threaded or fusion welded plastic pipe and fitting installations to larger solvent-welded and bell-and-spigot pipe systems. This module provides information about the selection, safe and proper use and care of the most common thermoplastic and thermosetting plastic pipe and fittings used in the piping trade.

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### **Cast Iron, Fibreglass, Glass, Lead and Historic Piping**

Cast iron soil pipe and fittings used in the plumbing trade range from smaller cast iron soil pipe and fitting installations for domestic housing DWV to larger commercial/industrial drainage piping systems. This module provides information on the selection, safe and proper use, and care of the more common cast iron soil pipe and fittings used in the plumbing trade.

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### **Pipe Hangers**

Supporting and anchoring piping systems manufactured from various piping materials is a critical aspect of the piping trades. Piping must be securely anchored in order to provide support for not only the pipe and fittings, but also the contents of the piping system. Hangers are used to keep piping level or to provide the required grade on the piping system. The selection of appropriate hangers for specific applications is important. This module lists a variety of common hangers and some of their applications.

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### **Valves**

Every piping installation should have a valve installed to control flow or pressure in the system. The valve is a key component for safety, serviceability and efficiency in a pipeline system. You must be able to visually identify a valve and determine if the valve is suited for the particular piping application in which it is installed.

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## **Introduction to Plumbing – Single Family Dwelling**

This module examines the history and organizational background of the plumber trade. An introduction to terminology will enable you to communicate in the language of the trade in both classroom and job related activities. Upon completion of this module you will be familiar with the trade terminology and tool requirements as applicable to single-family residential construction and be able to sketch, label and size, referencing the *National Plumbing Code of Canada 2005* (NPC-05), a simple residential plumbing system.

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## **Building Drains, Sewers, and Vents**

To successfully complete the drainage and venting system required for the modern home, piping arrangements, other than stack-vented arrangements, are possible and necessary for portions of the network. Suitable preliminary assessment of the site, along with thorough knowledge of possible plumbing arrangements, is necessary to determine the most cost effective method to plumb the numerous fixture arrangements found in various dwellings.

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## **Fixture Traps, Floor Drains, Cleanouts and Manholes**

It is critical to the proper operation of a fixture that the trap protecting a fixture be of an approved type, be correctly sized and installed in an approved manner. This module will enable you to install and service drainage and venting systems in accordance with the *National Plumbing Code of Canada 2005*, plumbing *Bulletins* and manufacturer's specifications.

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## **Plumbing Fixtures**

The ability to identify and install plumbing fixtures associated with single-family dwellings is an important skill that you will use extensively during your career. Upon completion of this module you will be able to install and service plumbing trim and fixtures in accordance with the *National Plumbing Code of Canada 2005*, plumbing bulletins and manufacturer specifications.

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## **The Water Supply System**

This module examines the basic water cycle and how potable water is produced and where it may be found in nature. Once a potable water supply has been established, a transportation system that will ensure a safe and adequate delivery of the potable water must be designed and installed. Upon completion of this module you will be able to install and service cold and hot potable water systems in accordance with the *National Plumbing Code of Canada 2005* plumbing *Bulletins* and/or manufacturer specifications.

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## **Boilers and Trim**

Boilers are manufactured from a variety of materials and in various patterns. The use of any particular type of boiler is dependent upon the application of the heating system. It is important that you understand the basic function of low-pressure hot water heating boilers and the trim that has to be installed upon them. You must also be able to differentiate between a low-pressure hot water boiler and a low-pressure steam boiler by visual inspection and by identifying the trim specific to steam boilers.

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## **Hot Water Heating Systems**

As the use of hot water heating or hydronic systems becomes more popular, installers must be able to recognize the proper application of various types of heating systems. This module will enable you to install and service hot water heating for a single family dwelling, including boilers, trim (hot water and low pressure steam), two-pipe supply systems and terminal heating systems in accordance with applicable codes and manufactures' specifications.

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## **Heat Emission Units**

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The previous modules examined the production of heat through the use of boilers and the transportation of heat through various piping systems. This module continues with the passage of heat through various piping systems and then focuses on the passage of heat to the final destination at the heat transfer units. This module will enable you to install and service hot water heating for a single family dwelling, including boilers, trim (hot water – low-pressure steam), two-pipe supply systems and terminal heating systems in accordance with applicable codes and manufactures' specifications.

## **Introduction to Gasfitting Fundamentals**

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This module provides information about two types of gases and their use. This module will enable you to explain and identify basic gas fundamentals and the purpose, legal status and organization of *CAN/CSA Natural Gas and Propane Installation Codes B149.1-05, B149, 2-05*, and the *Gas Bulletins*.

## **Introduction to Gasfitting Codes and Regulations**

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This module provides you with the specifics of your responsibilities as a gasfitter; on the installation of piping and fittings; terminology in the gas trade; and the importance of working in a responsible and safe manner. Upon completion of this module you will be able to identify and apply rules pertaining to the installation of piping and tubing systems for various conditions of use in accordance with the *CAN/CSA – B149.1-05 Natural Gas and Propane Installation Code (Section 1-4)*, *CAN/CSA B149.2-05 Propane Storage and Handling Code*, and the *GAS Bulletins*.

## **Properties of Gases and Principles of Combustion**

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The properties of gases and the principles of combustion are the basis of the gas industry. This module will teach you how to work safely and efficiently in the gas industry.

## **Measurement and Calculation of Pressure Drop**

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The fuel (gas) is brought to the customer's premises by built-up pressure in a line. In a safe and efficient manner, you will use the pressure in the gas line to bring it to its final destination, which is the appliance. This module will enable you to define and calculate pressure drop in a gas piping system by using manometers and mechanical pressure gauges.

## **Natural Draft Burner Adjustments and Gas Consumption**

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This module will provide you with information on rating plates, how to read them and how to apply this information to the appliance installation requirements.

## **Introduction to Oxyacetylene Equipment and Rigging**

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The use of oxyacetylene and rigging equipment is an integral part of the plumbing trade. It is important that you be aware of the correct procedures for handling, assembling, testing and using of oxygen and acetylene gases and equipment. A basic knowledge of rigging equipment is also required in order for you to perform various lifting tasks safely and productively.

## **Applied Mathematics**

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In this module, you will review several areas of math including: working with whole numbers, fractions, decimals, percentage and ratios and metric and imperial measurement. These skills are important to ensure accuracy and efficiency in the workplace. You will review your mathematical skills using practical, trade-related questions.

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### **Perimeters, Areas, Percentage and Grade**

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This module gives you information and practice in utilizing basic mathematical skills. The formulas, examples and practice questions included in this module will enable you to calculate perimeters and areas of rectangles, triangles and circles. Practice examples are included to illustrate the importance of correct and accurate grade calculations.

### **Temperature and Heat**

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The use and transfer of heat energy forms one major component of the plumber trade. This module is designed to give you information and practice in utilizing heat and temperature calculations.

### **Matter, Density and Relative Density**

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This module is designed to give you information on matter, density and relative density as related to the pipe trades. These basic concepts form the foundation for understanding the concepts of pressure, buoyancy and electricity.

### **Pressure and Atmosphere**

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This module provides you with the skills necessary to apply the principles of force and pressure. After completing this module, you will be able to define and calculate force and pressure in imperial and metric units. In addition, you will be able to define atmospheric pressures and convert atmospheric pressure readings from one type of unit to another.

### **Transfer of Heat and the Effects of Heat**

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This module is designed to give you information on the methods of heat transfer and how they affect the plumbing trade. It also explains expansion and contraction and how to calculate the expansion or contraction of different materials. The effects of expansion and contraction are discussed and how these effects can be used or controlled. This module will enable you to describe the heat transfer process that apply to relative pipe trades

### **Introduction to Sketching and Drawing**

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Reading drawings is similar to reading a book. The major difference is that, instead of relying on words, drawings use symbols to convey meaning. What may look like a jumble of lines and crude pictures is actually a representation of an actual installation that can be interpreted by engineers, draftsmen and trades personnel with a common understanding of what the finished product will resemble. This module will enable you to draw and interpret basic orthographic drawings.

### **Blueprint Interpretation**

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Construction blueprints are drawn to scale. Scaling is the means of taking the actual dimensions required on the site and reducing them down at a specified ratio to fit on a drawing. The type of information that the drawing is trying to convey will determine what ratio will be used. Certain parts of the construction process require large-scale drawings to allow the tradesperson to visualize all of the details of the project. An understanding of how to use the various scales will enable the tradesperson to use this feature to his/her advantage.

### **Introduction to Code**

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The purpose of this module is to help you become familiar with the structure of the National Plumbing Code book, become familiar with the layout of the rules within each section, interpret various rules, complete the required calculations and understand the role of the code book in the Plumber Trade.

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### **Vents and Roof Terminals**

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To successfully complete the drainage and venting system required for the modern home, piping arrangement other than stack-vented arrangements are possible and necessary for portions of the network. This module will enable the student to install and service drainage and venting systems in accordance with the *National Plumbing Code of Canada 2005*, plumbing *Bulletins* and/or manufacturer's specifications.

### **Plumber Apprenticeship Training Program Orientation**

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This module helps you to better understand the apprenticeship system in New Brunswick and the processes involved in developing and maintaining your trade. This module will enable you to understand the role of the trades' people, employers, the Provincial Apprenticeship Board and New Brunswick Apprenticeship in the development and maintenance of the Plumber trade in New Brunswick.

### **Work Placement**

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Experience on the job is where it all comes together. Students will have the opportunity to work on the job with a certified industry expert who can provide advice and guidance as you start your new career in the Plumber trade. The expert will evaluate your knowledge and abilities as part of this work term.