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# PLUMBING I

**March 2006**

**PLUMBING I**

## I. COURSE DESCRIPTION

The plumbing I course is the beginning of three full years of study and practical shop work in the plumbing trade. This course will emphasize the safe use of power and hand tools. It will introduce the basic knowledge and use measurement, steel pipe threading and installation (pipe fitting). The students will demonstrate knowledge of basic soldering, the correct use of copper, steel and basic Polyvinyl Chloride and Acrylonitrile Butadiene Styrene (PVC/ABS) waste, and vent fitting identification. The students will also learn the basic installation of hot water heaters. In addition, through web-based projects the students will enhance their understanding of basic computer skills.

## II. COURSE OBJECTIVES/OUTLINE

### A. SAFETY IN THE PLUMBING INDUSTRY

The student will be able to:

1. Describe all safety procedures for hand and power tools in the Plumbing shop. (9.1A;B; 9.2 A;B;C;D;F)
2. Complete the OSHA requirements for job safety. (9.1A;B; 9.2 A;B;C;D;F)
3. Learn basic first aid procedures. (9.1A; 9.2 A;B;C;F)
4. Learn the P.A.S.S. sequence for using portable fire extinguishers. (9.1A;B; 9.2 A;B;C;D;F)
    a. Pull the pin
    b. Aim the nozzle at the base of the fire
    c. Squeeze the handle
    d. Sweep the nozzle

### B. MEASURE CUT AND THREAD STEEL PIPE

The student will be able to:

1. Describe the procedure for cutting and threading steel pipe. (9.1B. 9.2A;B;C;F)
2. Read and transfer steel pipe measurements from student-generated drawings. (9.1A;B. 9.2A;B)
3. Cut steel pipe to a plus or minus 1/16 of an inch with power and hand tools. (9.1B. 9.2A;B;F)
4. Perform threading procedures on steel pipe ½" to 1 ¼" diameter with power and hand tools. (9.1B. 9.2B;F)
5. Learn the proper use of wrenches. (9.1A;B. 9.2A;B;F)
6. Install steel threaded pipe into prescribed fittings illustrated on drawings. (9.1B. 9.2B;F)
7. Test for leaks with 18lbs per square inch of air. (9.1B. 9.2A;B;D;F)

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C. SOLDERING

The student will be able to:

1. Learn the names of all the tools necessary to perform soldering. (9.1A;B. 9.2A;B;F)
2. Demonstrate the proper handling techniques of soldering to include: (9.1A;B. 9.2A;B;C;D;E;F)
    a. Safety (gloves and eye protection)
    b. Cleaning (fittings and pipe)
    c. Fluxing
    d. Soldering
    e. Wiping soldered joints
3. Understand the cost and quality of soldering equipment. (9.1A;B. 9.2A;B;C;D;E;F)
    a. Cutters
    b. Acetylene tanks
    c. Gauges.
    d. Soldering handle
    e. Soldering tips
4. Determine different types of copper pipe and how to identify them according to their identification colors. (9.1B. 9.2A;B;F)

D. COPPER, STEEL AND PVC/ABS FITTINGS

The student will be able to:

1. Name the various materials used in pipe and fittings. (9.1A. 9.2A;B)
2. Suggest appropriate applications for each type of material. (9.1B. 9.2A;B;D)
3. Recognize and properly name various fittings and pipe. (9.1A;B. 9.2A;B;D)
4. List grade and sizes of pipe and fittings. (9.1A;B. 9.2A;B;C)
5. Interpret markings used on copper and plastic pipe. (9.1A;B. 9.2A;B)
6. Discuss new materials that are being used for pipe and fittings. (9.1A;B. 9.2A;B;C;F)
7. complete solvent weld connections with PVC/ABS piping systems;

E. HOT WATER HEATERS

The student will be able to:

1. Explain the steps involved to install a hot water heater. (9.1A;B. 9.2A;B;C;D;E;F)
2. Install cold water to the hot water heater and heated water to hot water fixtures in the building. (9.1B. 9.2A;B;F)
3. Demonstrate with some detail how the controls and heating elements work in a hot water heater. (9.1B. 9.2A;B;C;D;F)
4. Describe the differences in the types of hot water heaters i.e.; gas, oil, electric and tank less. (9.1B. 9.2A;B;C;D;F)
5. Install the necessary venting for vapors from hot water heaters. (9.1B. 9.2A;B;F)
6. Perform minor maintenance on hot water heaters. (9.1A. 9.2A;B;F)

F. COMPUTER PROJECTS

The student will be able to:

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1. Research plumbing problems. (9.1A;B. 9.2A;B;C;D;E;F)
2. Define simple solutions to the problems. 9.1B. 9.2A;B;C)
3. Organize pictures and videos for instructional use. (9.1A;B. 9.2A;B;C;D)
4. Formulate new concepts to enhance website. (9.1A;B. 9.2A;B;C;D;E;F)
5. Annually update the web sites repair and installation procedures. (9.1A;B. 9.2A;B;D)

## III. TEXTBOOKS AND INSTRUCTIONAL MATERIALS.

Modern Plumbing E. Keith Blankenbaker; Price, Goodheart-Willcox 2005. (Includes teacher edition-test bank and workbook).

Internet via PCTI computers.

## IV. INSTRUCTIONAL STRATEGIES

In order to meet the individual needs of our students, differentiated instruction is utilized in every class. This involves the use of a variety of instructional strategies, including but not necessarily limited to: readings and exercises from the approved text(s) and related supplemental materials; hands-on practical projects; shop demonstrations by the teacher and students; cooperative group activities; teacher generated handouts; lecture in conjunction with class discussion and notes; debates; role playing activities; map work; activities involving music and art from relevant historical eras; oral and written reports; simulations; primary resource based analysis and questioning; multimedia documentaries, movies, and slideshows; and Internet and ITV presentations and conferences.

## V. EVALUATION

Students will be evaluated objectively in accordance with state and local guidelines. It is our goal to afford students every opportunity to succeed and to include both formative and summative methods of assessment. A wide variety of evaluation methods will be utilized in order to accommodate the multiple intelligences of our students, and incorporate the variety of learning styles and diversification of instructional methods. Evaluation methods will include, but are not necessarily limited to, the following:

· Tests and Quizzes (questioning strategies include essay, multiple choice, true and false, matching, fill in the blank, and short answer);
·Shop/practical projects;
·Classroom activities;
·Research;
·Reports;
·Notebook maintenance;
·Class participation;
·Rubrics;
·Portfolios;
·Teacher observation; and,
·if applicable, Career Supervisor Co-Op performance.

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Evaluations may be oral, written or otherwise expressed depending on the direction of the instructor. Evaluation criteria will address the 2004 New Jersey Core Curriculum Content Standards.

## VI. SCOPE AND SEQUENCE CHART

Key: I = Introduced
D = Developed in Depth
R = Reinforced

| SKILL TO BE LEARNED | 10 | 11 | 12 |
|---|---|---|---|
| Use a ruler to make and transfer measurements. | ID | IDR | IDR |
| Cut and thread steel pipe from ½" to 1 ¼". | ID | IDR | IDR |
| Make solvent welded connections on PVC/ABS pipe and fittings. | ID | IDR | IDR |
| Use soldering tools to perform basic soldering functions. | ID | IDR | IDR |
| Demonstrate knowledge of single fixture drainage and venting. | I | ID | IDR |
| Install a gas fired hot water and electric hot water heater. | ID | IDR | IDR |
| Maintain a clean and orderly work place. | IDR | IDR | IDR |
| Use hand and power tools safely. | IDR | IDR | IDR |
| Review all the materials covered in this curriculum. | IDR | IDR | IDR |
| Create and modify Internet computer projects for instructional use. | I | ID | ID |

## STUDENT HANDOUT

### PLUMBING I

1. COURSE OVERVIEW

The plumbing I course is the beginning of three full years of study and practical shop work in the plumbing trade. This course will emphasize the safe use of power and hand tools. It will introduce the basic knowledge and use measurement, steel pipe threading and installation (pipe fitting). The students will demonstrate knowledge of basic soldering, the correct use of copper, steel and basic Polyvinyl Chloride and Acrylonitrile Butadiene Styrene (PVC/ABS) waste, and vent fitting identification. The students will also learn the basic installation of hot water heaters. In addition, through web-based projects the students will enhance their understanding of basic computer skills.

2. PROFICIENCIES

a. Demonstrate a working knowledge of shop safety procedures;
b. Demonstrate proficiency in the following course objectives needed to advance to Plumbing II:
    1. Use of hand and power tools;

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2. Work with units of measure;
3. Cut and thread steel pipe using hand and power tools;
4. Exhibit working knowledge of the soldering process;
5. Demonstrate knowledge of single fixture drainage and venting installation.
6. Complete solvent weld connections with PVC/ABS piping systems;
7. Create and update Internet based projects.

c. Work cooperatively and effectively with others;
d. Demonstrate use of shop tools and equipment;
e. Demonstrate good work habits (clean, neat, healthy, safe).