

# **PLUMBING III**

**March 2006**

## **PLUMBING III**

### **I. COURSE DESCRIPTON**

The plumbing III course includes advanced plumbing theory and practice. Students will further understand boiler and heating design and installation (to include water and steam units) as well as the National Plumbing Codes. In addition, students will learn general repairs and trouble shooting on heating systems. Students will continue to utilize basic math and its application to the principals of plumbing and heating. By studying plumbing III, students will learn to efficiently price, stock and order plumbing and heating materials. Emphasis is placed on how to find and apply for a job in the plumbing trade. Students are continually required to demonstrate an understanding of job related first aid, and the ability to maintain a clean and orderly work place. Lastly, internet based projects will be continually developed.

### **II. COURSE OBJECTIVES/OUTLINE**

#### **A. ADVANCED PLUMBING THEORY**

The student will be able to:

1. Install general domestic plumbing drainage systems. (9.1B. 9.2A;B;F)
2. Understand drainage installation above and below ground. (9.1B. 9.2A;B;F)
3. Install pipe supports for water and waste lines. (9.1B. 9.2B;F)
4. Determine "pitch" and "grade" in the plumbing system.(9.1B. 9.2A;B)
5. Understand the basic principals of plumbing vent systems (9.1B. 9.2A;B;F)
6. Describe, diagram, and install hot and cold water lines to and from the hot water heater in domestic applications. (9.1B. 9.2A;B;C;D;F)
7. Install re-circulating domestic hot water systems in housing and commercial buildings. (9.1B. 9.2A;B;F)

#### **B. BOILER INSTALLATION AND HEATING DESIGN**

The student will be able to:

1. Describe the Installation procedures for gas and oil fired hydronic boilers. (9.1B. 9.2A;D)

2. Install gas and oil fired hydronic boilers. (9.1B. 9.2A;B;C;F)
3. Understand and install mono-flow and loop heating systems. (9.1B. 9.2A;B)
4. Install and repair heating pumps. (9.1B. 9.2A;B;F)
5. Install multi-zone valves. (9.1B. 9.2A;B;F)
6. Install safety devices (relief valves, low water cut-offs). (9.1B. 9.2B;F)
7. Install control devices (relays, transformers and primary relay controls). (9.1B. 9.2B;F)
8. Install hot water makers in hydronic heating systems. (9.1B. 9.2A;B;F)
9. Understand boiler-venting systems. (9.1B. 9.2A;F)
10. Understand and install basic wiring on hydronic boilers and steam units. (9.1B. 9.2A;B;F)

#### **C. BASIC NATIONAL PLUMBING CODES**

The student will be able to:

1. Interpret and apply codes to shop projects. (9.1B. 9.2A;B;C;D;F)
2. List the basic principals of the plumbing code. (9.2A;B;D)
3. Understand a plumbing code can be established at state and local levels. (9.2B)
4. Describe the types of materials approved under the National Plumbing Code. (9.2A;B)
5. Describe the types and location of traps and cleanouts as described in the National Plumbing Code. (9.1B. 9.2A;B;F)
6. Understand water pipe, drainage and vent requirements in the National Plumbing Code. (9.1B. 9.2A;B;C;D)
7. Understand all provisions for inspections and testing of the plumbing system. (9.1A;B. 9.2A;B;C;D;F)
8. Fill out a plumbing permit application. (9.2B)

#### **D. STEAM HEATING SYSTEMS**

The student will be able to:

1. Install gas and oil fired steam boilers. (9.1B. 9.2A;B;F)
2. Effectively “size” a steam system. (9.1B, 9.2A)
3. Understand steam boiler control devices. (9.1B. 9.2A)
4. Perform basic wiring on steam boiler controls. (9.1B. 9.2A;B;F)
5. Describe, install and repair safety devices in a steam system. (9.1B. 9.2A;B;F)
6. Repair or replace steam radiator vents and valves. (9.1B. 9.2A;B;F)

#### **E. BASIC MATH FOR PLUMBING AND HEATING**

The student will be able to:

1. Calculate decimal equivalents of feet and inches. (9.1B. 9.2B)
2. Calculate British Thermal Units (B.T.U.). (9.1B. 9.2A;B)
3. Calculate area roof drain sizes and locations for commercial buildings. (9.1B. 9.2A;B)

4. Understand percentages when pricing a plumbing or heating proposal. (9.1B. 9.2A;B;E)

## **F. PRICING AND ORDERING PLUMBING AND HEATING MATERIALS**

The student will be able to:

1. Develop a price quote. (9.1A;B. 9.2A;B;C;D;E)
2. Serve customers at a counter. (9.1B. 9.2B;C;D)
3. Reference a parts manual when ordering from a manufacturer. (9.1B. 2A;B)
4. Demonstrate an ability to stock inventory orders. (9.1A;B. 9.2B;D)
5. Read and understand packing lists when materials are delivered. (9.1B. 9.2B;D;E)
6. 9.2B;D;E)

## **G. OBTAINING A JOB**

The student will be able to:

1. Locate a plumbing job (classified ads, word of mouth, etc.) (9.1A;B. 9.2A;B;C;D;E)
2. Write a résumé. (9.1A;B. 9.2A;B;C;D;E)
3. Write a letter of application. (9.1A;B. 9.2A;B;C;D)
4. Answer interview questions. (9.1A;B. 9.2A;B;C;D;E)
5. Make an appointment by phone or internet. (9.1A;B. 9.2B;C;D)
6. Proper dress for a job interview. (9.1A;B. 9.2B;D)
7. Follow up on a job interview. (9.1A. 9.2B;D)
8. Evaluate a job offer. (9.1A;B. 9.2A;B;C;D;E)

## **H. COMPUTER PROJECTS FOR LAYMAN SEEKING INSTRUCTIONAL GUIDELINES**

The student will be able to:

1. Research the problem. (9.1A;B. 9.2A;B;C;D;E)
2. Define simple solutions to the problem. (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)
5. Annually update web sites repair and installation procedures. (9.1A;B. 9.2A;B;D)

## **III. TEXTBOOKS AND INSTRUCTIONAL MATERIALS**

Plumbing Technology; Lee Smith, Price; Delmar (Thomson Learning 2000)  
(Includes teacher edition-test bank).

National Standard Plumbing Code Illustrated

**PHCC 2000**

Plumbing, Heating and Cooling Contractors.

Residential Plumbing; Leney Barclay, 1999, Price; Multi-State Academic and Vocational Curriculum Consortium. Inc. (Includes teacher edition and test banks).

Modern Plumbing; Charles H. Owenby, 2000, Price; Goodheart-Willcox Company Inc.

Job practice manual.

**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; 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);
- Projects;
- Classroom activities;
- Research;
- Reports;
- Notebook maintenance;
- Class participation;
- Rubrics;
- Portfolios;
- Teacher observation; and,
- if applicable, Career Supervisor Co-op performance.

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.  
(CCCS 9.1,9.2)

## **VI. SCOPE AND SEQUENCE CHART**

Key I = Introduced

D= Developed in Depth

R = Reinforced

<b>SKILL TO BE LEARNED</b>	<b>12</b>
Advanced plumbing theory.	IDR
Installation of steam and water boilers.	ID
Installation of steam and water heating systems.	ID
Understanding basic National Plumbing Codes.	ID
Job related first aid.	ID
Basic math in the plumbing industry.	ID
Pricing and ordering of plumbing materials.	ID
How to apply for a job.	IDR
General repairs on heating systems.	ID
Web-based projects for instructional use.	IDR

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How to apply for a job.	IDR
General repairs on heating systems.	ID
Web-based projects for instructional use.	IDR

## **STUDENT HANDOUT**

### **PLUMBING III**

## **COURSE OVERVIEW**

The plumbing III course is designed to continue with web-based projects and provide the student with advanced plumbing theory. Students will develop an understanding of boiler and heating design and installation (to include water and steam units). This course will also emphasize use of the National

Plumbing Codes. Students will learn general repairs and trouble shooting on heating systems. Throughout the course basic math will be applied to the principals of plumbing and heating. By studying plumbing III, students will have the ability to price, stock and order plumbing and heating materials. They will also learn how to select, locate, and obtain a job in the plumbing trade. All students will be required to demonstrate an understanding of job related first aid, and continue to maintain a clean and orderly work place.

## **PROFICIENCIES**

1. Describe how to install a steam or water boiler.
2. Install a steam or water boiler.
3. Define basic National Plumbing Codes.
4. Demonstrate knowledge of on the job first aid.
5. Be able to perform basic math to the principals of plumbing and heating
6. Demonstrate an ability to correctly order parts and materials for a plumbing or heating job.
7. Be able to apply for a job in the plumbing industry.