INTRODUCTION

This course will provide in-depth instruction in the setting of residential bathroom and kitchen plumbing fixtures.

Residential Construction Plumbing II (PFPB 2445) required course for the completion of a two year Associates of Applied science Degree in Maintenance Technology or a Level I or Level II certificate of Completion in the Building Trades Program.

This course is occupationally related and serves as a preparation for a career in the Plumbing or Building Trades career field.

Prerequisites: This course has a prerequisite of PFPB 2409 or consent of the Department Chair.

Alphanumeric coding used through this book denotes integration of SCANS occupational competencies (C1, etc.) and Foundation skills (F1, etc.).

LEARNING OUTCOMES

Upon successful completion of this course, Residential Construction Plumbing II, the student will:

Install various types of water closets. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Install lavatories and bidets. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Install gas and electric water heaters. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Install kitchen sinks with dishwashers and garbage disposals. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Practice plumbing safety. (C5, 6)(F1, 2, 3, 5, 9, 10)
Read plumbing blueprints. (C5, 6, 7)(F1, 2, 3, 8, 9, 10)
Explain hydraulic and pneumatic principles as they apply to plumbing. (C5, 6, 7)(F1, 6, 8, 9, 10)
Compute heat pressure. (C5, 6, 7)(F1, 2, 3, 9)
Use plumbing codes and tables. (C5, 6, 7)(F1, 2, 3, 9)
Perform plumbing rough-in and repair operations. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Test plumbing systems. (C5, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Use plumbing tools and equipment. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
Discuss water treatment. (C5, 6, 7)(F1, 6, 8, 9)
Discuss private waste disposal systems and water drainage systems. (C5, 6, 7)(F1, 6, 8, 9)
Discuss water and energy conservation, sprinkler systems, spas, hot tubs and pools. (C5, 6, 7)(F1, 6, 8, 9)
Discuss wells, pumps and pressure tanks. (C5, 6, 7)(F1, 6, 8, 9)
Plan a project, do a budget, select personnel and do an organization chart. (C1, 2, 3, 4, 5, 6, 12, 15, 17, 18, 19, 20)(F1, 2, 3, 6, 7, 8, 9, 10, 12)

**INSTRUCTIONAL MATERIALS**

Instructional materials for this course can be found at [www.ctcd.edu/books](http://www.ctcd.edu/books)

Supplemental Reading: As assigned by the instructor.

Audio – Visual Aids: See resource list at end to this module book.

Other instructional material: as selected by the instructor.

**COURSE REQUIREMENTS**

This course is being taught in a self-paced mode. It differs from the traditional college course in that you are allowed to work on your own and at your own speed with limitation. This course is 96 clock hours in length. The student may set his/her own schedule within the time frame the course if offered. You must attend class on the days and at the times you selected when you enrolled in the course.

You will have an assigned instructor. If at any time you do not understand a reading assignment, audio visual presentation or lab work, ask your instructor for assistance. He is there for you!

This module book is designed to inform you of the sequence in which this course will be presented. You must follow this sequence and you must do what the module book says. It contains reading assignments, written assignments, audio visual presentations and lab assignments that you must complete or watch. Written assignments will be turned in as directed by the instructor. You must let your instructor know when you are ready to do a learning activity, performance exam or take a scheduled exam.

The student should take notes when viewing DVD’s. Exams will be taken from reading assignments only. If instructor handouts are given to you, you must study them; exams questions will be taken from these handouts also.

**Performance Exams:** Each student will clean all tools and equipment that they use and properly store them and clean their work area after the completion of each task.

**Certificate Students:** All lab work will be completed on an individual basis. The student will receive a “pass” or “fail” on the task. Students who fail to complete a task correctly to industry standards must repeat the task. The instructor will date and initial each performance exam task.
as it is satisfactorily completed. **NOTE: Students who have selected the alpha-numeric grading system will be graded as outlined for degree students (see below).**

**Degree Students:** Laboratory tasks (performance exam) will be completed on an individual basis except when limited by tools and/or materials. **Each performance exam is worth a maximum of 8.3 points.** The maximum lab grade is 100 points. The instructor will deduct points from each lab task score for failure to follow safety precautions and/or a failure to complete the project to industry standards. The instructor will date, initial, and post the points earned for each performance exam as it is completed.

The following is part of the course requirements: Each student will assist in lab cleanup at the close of the evening classes and will assist in unloading and storing supply shipments. Failure to do so will result in a failure to complete all course requirements and the student could receive an “F” or “N” for the course.

There will be nine (5) written examinations in this course (4 module/unit exams and an exit exam). **All written exams must be completed before taking the performance exam for each module.** The exit exam is a comprehensive exam that covers the entire course. Certificate students will be allowed to take the exit exam a maximum of three (3) times and score 70% or better. Failure to achieve a 70% score on the exit exam in three (3) times will result in an “N” for the course and the student must retake the course. **Degree students should refer to the “grading” section of this outline for guidance.**

The student must complete all written assignments to receive a grade. Written assignments for each unit will be turned into the instructor prior to starting performance exams for that module. **Degree students must complete reading and written assignments at home.**

If you have special needs because of learning disabilities or other kinds of disabilities, please feel free to discuss this with the instructor. The instructor will attempt to meet your needs with the assistance of counselors, tutors, and the Disabilities Services Office. Program/course integrity will not be sacrificed. Students must meet all course requirements.

**GRADING**

**Certificate Students:** Students will be graded using the standard Skills Center “Pass-Fail” system used for self-paced programs. To satisfactorily complete the written exams, the students must score 80% on tests (except the exit exam, 70%). Students who fail to make the 80% on any exam (except the exit exam) must retake the exam. The current test re-take policy will apply to all certificate students. The student must satisfactorily complete all written and performance exams to receive a passing grade (“P”).

**Degree Students:** Students will be graded using an “alpha-numeric” system as outlined below. Grades made on performance and written exams will be the grade received, including the exit exam. **Students will not be allowed to retake written exams or redo performance exams.**
Written exams: Average of written exams will count 40% of the final grade.

Completion of written assignments/activities will count 10% of the students final grade.

Performance Exams (Lab Work) will count 50% of the final grade.

Grade Computations: (Example)
Written Exam Scores: (There will be 9 written exams)
Exam 1  90
Exam 2  80
Exam 3  70
240 divided by 3 = 80 (Average Written Exams)

Written Exam Score Average    80 x 40% = 32 points
Written Assignments                100 x 10% = 10 points
Performance Exam Score           80 x 50% = 40 points

Total = 82 points = B

NOTES AND ADDITIONAL INSTRUCTIONS FROM THE COURSE INSTRUCTOR

COURSE WITHDRAWAL: It is the student’s responsibility to officially withdraw from a course if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application for Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

CTC Form 59 will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is:

- 10-week sessions     Friday of the 8th week
- 8-week sessions      Friday of the 6th week
- 5-week sessions      Friday of the 4th week

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

A student who officially withdraws will be awarded the grade of “W” provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of “F”, “N”, “FN”, or “XN” for nonattendance.
Administrative Withdrawal: An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.

Incomplete Grade: The College catalog states, “An incomplete grade may be given in those cases where the student has completed the majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course…” Prior approval from the instructor is required before the grade of “I” for Incomplete is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an “F” for the course.

Cellular Phones: The use of a cell phone or any cellular option to include but not limited to text messaging, gaming, or photographing during class periods is prohibited. Cell phones will be turned off prior to entering the Building Trades Lab’s or Testing Area. Exceptions must be approved by the Building Trades Instructor.

American’s With Disabilities Act (ADA): Disability Support Services provides services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Review the website at www.ctcd.edu/disability-support for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

Instructor Discretion: The instructor reserves the right of final decision in course requirements.

Civility: Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

Absence from the class may be unavoidable in some situations. These include illness, military/civilian job requirements, or a death in the immediate family. Documentation is required in the case of excused absences for job requirements. Excuses will be on company letterhead stationary signed by the immediate supervisor stating the reason for the absence for civilian jobs. Excuses for military personnel must be signed by the 1st Sergeant or the Company Commander. NOTE: This does not apply to VA, VA/Voc, or Financial Aid students. There are no excused absences for these students. Talk to your funding agency if you have questions.
FIRST CLASS MEETING

The instructor will introduce the course and show the student the textbook.

The instructor will verify the class enrollment form:

The instructor will have the student read and sign the course requirements sheets.

The instructor will discuss the following topics with the student:
  - Course requirements, objectives and how the course works
  - Policy letters
  - Student handouts
  - Lab sheet and lab work (Enabling tasks, Performance exams, Competency profile)
  - Exam, grading, reading and written assignments
  - Absences
  - Shop/classroom cleanup – tools
  - Dress code
  - Parking
  - Sign-in computer
  - Course outline/fact sheets/student handouts
  - Hazardous communications/MSDA information
  - Shop safety
COURSE OUTLINE OR SEQUENCE

Module 2445-01  Plumbing Hydraulics, Pneumatics, Print Reading, and Sketching

Module Learning Outcomes: Upon satisfactory completion of this module the student will:

- Practice plumbing safety.  (C5, 6)(F1, 2, 3, 5, 9, 10)
- Read plumbing blueprints.  (C5, 6, 7)(F1, 2, 3, 8, 9, 10)
- Explain hydraulic and pneumatic principles as they apply to plumbing.  (C5, 6, 7)(F1, 6, 8, 9, 10)
- Compute head pressure.  (C5, 6, 7)(F1, 2, 3, 9)
- Use plumbing codes and tables.  (C5, 6, 7)(F1, 2, 3, 9)

In your “Modern Plumbing” textbook read Chapters 5 and 6. You will be tested on this material.

See your instructor and ask him to explain any part of plumbing hydraulics, pneumatics, print reading, and sketching that you don’t understand.

View Audio Visuals: There are currently no audio visuals for this module.

Review for Module 2445-01 Written Exam. Study all previous assignments in this module. See your instructor and ask him to explain any area of plumbing hydraulics, pneumatics, print reading, and sketching that you do not understand.

Module 2445-01 Written Exam: See your instructor
Module 2445-02    Design Plumbing Systems and Storm Water and Sumps

Module Learning Outcomes: Upon satisfactory completion of this module the student will:

- Practice plumbing safety.  (C5, 6)(F1, 2, 3, 5, 9, 10)
- Read plumbing blueprints.  (C5, 6, 7)(F1, 2, 3, 8, 9, 10)
- Use plumbing codes and tables.  (C5, 6, 7)(F1, 2, 3, 9)

In your “Modern Plumbing” textbook read Chapters 20, 21, and 24. You will be tested on this material.

View Audio Visuals: There are currently no audio visuals for this module.

See your instructor and ask him to explain any part of designing plumbing systems and storm water and sumps that you do not understand.

Review for Module 2445-02 Written Exam. Study all previous assignments in this module. See your instructor and ask him to explain any area of designing plumbing systems and storm water and sumps that you do not understand.

Module 2445-02 Written Exam: See your instructor.
Module 2445-03  Water Supply Systems, Water Heaters, and Water Treatment

Module Learning Outcomes: Upon satisfactory completion of this module the student will:

- Discuss wells, pumps and pressure tanks. (C5, 6, 7)(F1, 6, 8, 9)
- Install various types of water closets. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Install lavatories and bidets. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Install gas and electric water heaters. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Install kitchen sinks with dishwashers and garbage disposals. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Practice plumbing safety. (C5, 6)(F1, 2, 3, 5, 9, 10)
- Read plumbing blueprints. (C5, 6, 7)(F1, 2, 3, 8, 9, 10)
- Use plumbing codes and tables. (C5, 6, 7)(F1, 2, 3, 9)
- Perform plumbing rough-in and repair operations. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Test plumbing systems. (C5, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Use plumbing tools and equipment. (C5, 6, 7, 15, 18, 19, 20)(F1, 3, 5, 8, 9, 10, 12)
- Discuss water treatment. (C5, 6, 7)(F1, 6, 8, 9)

In your “Modern Plumbing” textbook read Chapters 11, 12, and 16. You will be tested on this material.

View Audio Visuals: “Rough Plumbing & Heating,” (DVD)
“Plumbing: Rough-in to Finish,” (DVD)

See your instructor and ask him to explain any part of water supply systems, water heaters, and water treatment that you do not understand.

Review for Module 2445-03 Written Exam. Study all previous assignments in this module. See your instructor and ask him to explain any area of water supply systems, water heaters, and water treatment that you do not understand.

Module 2445-03 Written Exam: See your instructor.
Module 2445-04 Septic System, Irrigation System, Swimming Pools, Hot Tubs, and Spas

Module Learning Outcomes: Upon satisfactory completion of this module the student will:

- Discuss private waste disposal systems and water drainage systems. (C5, 6, 7)(F1, 6, 8, 9)
- Discuss water and energy conservation, sprinkler systems, spas, hot tubs and pools. (C5, 6, 7)(F1, 6, 8, 9)
- Plan a project, do a budget, select personnel and do an organization chart. (C1, 2, 3, 4, 5, 6, 12, 15, 17, 18, 19, 20)(F1, 2, 3, 6, 7, 8, 9, 10, 12)

In your “Modern Plumbing” textbook read Chapters 23, 26, and 27. You will be tested on this material.

View Audio Visuals: “Underground Sprinklers,” (DVD)

See your instructor and ask him to explain any part of septic systems, irrigation systems, swimming pools, hot tubs, and spas that you do not understand.

Review for Module 2445-04 Written Exam. Study all previous assignments in this module. See your instructor and ask him to explain any area of septic systems, irrigation systems, swimming pools, hot tubs, and spas that you do not understand.

Module 2445-04 Written Exam: See your instructor.
Module 2445-05 Exit Exam

Module Learning Outcomes: Upon satisfactory completion of this module the student will:

- Use basic thinking skills and demonstrate personal qualities and work practices used in the workplace.
- Complete the Exit Exam.

Review for Exit Exam: Review all previous assignments.

See your instructor and ask him to explain anything that you do not understand about building trades fundamentals.

Module 2445-05 Written (Exit) Exam: See your instructor.