San Bernardino Valley College
Curriculum Approved: May 2, 2005

I. COURSE INFORMATION:

A. Division: Technical
Department: Water Supply Technology
Course ID: WST 145
Course Title: Backflow Prevention Devices
Units: 3
Lecture: 2.50 Hours
Laboratory: 1.50 Hours
Prerequisite: WST 144
Corequisite: None
Dept. Advisory: None

B. Catalog and Schedule Description:
Concentrated training in recognition and abatement of cross-connection in water supply and plumbing systems. Hands-on backflow prevention device testing procedures. Instruction toward certificate as a backflow prevention device tester.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES:

Upon successful completion of the course, the student should be able to:

A. Explain handling and storage requirements for test gage equipment.
B. Read and critically evaluate examples of cross-connection and backflow incidents.
C. Describe the installation requirements for each type of backflow preventer.
D. Identify precautions and possible hazards relating to field-testing of backflow prevention assemblies.
E. Read, discuss, and respond to preliminary steps leading to field-testing of a backflow prevention assembly.
F. Demonstrate and explain the field-test procedures for a reduced pressure principle backflow prevention assembly.
G. Demonstrate and explain the field-test procedures for a double check valve backflow prevention assembly.
H. Demonstrate and explain the field-test procedures for a pressure vacuum breaker prevention assembly.
I. Identify and describe all physical identification of a backflow prevention assembly for field-test documentation.
J. Identify and describe all data and tester identification resulting from the field test of a backflow prevention assembly for recording on the test and maintenance report form.
K. Identify and describe the operation of various field-testing gage equipment.

IV. COURSE CONTENT:

A. Hydraulics of Backflow and Cross-Connections
   1. Backsiphonage
   2. Backpressure
B. State Law
   1. Plumbing Code
   2. Degree of Hazard
   3. Contaminant
   4. Pollutant
C. Types of Assemblies
   1. Reduced Pressure Principle Assembly
   2. Double Check Valve Assembly: Components and Field-Testing Procedures
   3. Pressure Vacuum Breaker Assembly: Components and Field-Testing Procedures
   4. Spill-Resistant Pressure Vacuum Breaker Assembly
D. Field-Testing Procedures
   1. Test Form Reporting Information and Procedures

2. Annual Compliance Test Form
3. Local Health Agency Documents
4. Liability and Tester Ethics

V. METHODS OF INSTRUCTION: (Please check all that apply and add any additional not listed.)

X Lecture
X Class and/or small group discussion
_____ Critical evaluation of texts, newspapers, journal articles, and other printed research
X Critical evaluation of films, videotapes, audiotapes, or other media forms
X Classroom demonstrations
X Field trips
X Guest speakers
_____ Other:
_____ Other:
_____ Other:

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:

A. Reading Assignment. Reading assignments are required and may include (but are not limited to) the following: Read USC Manual on Cross-Connection Control Practice and provide a list precautions and possible hazards relating to field-testing the following assemblies:
   1. Reduced pressure principle backflow prevention assembly.
   2. Double check valve backflow prevention assembly.
   3. Pressure vacuum breaker assembly.
   4. Spill–resistant pressure vacuum breaker assembly.

B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Read USC Manual on Backflow Prevention Assembly Field-Testing Procedures and Gage Accuracy Verification, identify and describe all data and tester identification resulting from the field test of a backflow prevention assembly for recording on the test and maintenance report form for the following assemblies:
   1. Pressure vacuum breaker assembly.
   2. Double check valve backflow prevention assembly.
   3. Reduced pressure principle backflow prevention assembly.
   4. Spill–resistant pressure vacuum breaker assembly.

C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: With the other members of your group, survey and evaluate the Campus water system. Prepare and make recommendations to the class in a visual presentation.

VII. EVALUATION:

A student's grade will be based on multiple measures of performance and will reflect the objectives explained above. A final grade of "C" or better should indicate that the student has the ability to successfully apply the principles and techniques taught in this course. These evaluation methods may include, but are not limited to, the following (Please check all that apply, and add additional ones not listed):

X Portfolios
X Projects
_____ Written papers or reports
_____ Presentations (oral and visual)
X Work performance (internships or field work)
X Lab work
X Comprehensive examinations (cumulative finals or certifications)
_____ Peer evaluation

_____ Self evaluation
X Classroom participation
X Homework
_____ Other:
_____ Other:
_____ Other:

VIII. TYPICAL TEXTS:

A. Foundation for Cross-Connection Control & Hydraulic Research, Manual of Cross-Connection Control, 10th Edition, University of Southern California, Los Angeles, CA, 2004
B. Cross Connection Control Manual, US Environmental Protection Agency, 2003
C. Recommended Practices for Backflow Prevention and Cross-Connection Control, American Water Works Association, 2004

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Calculator

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PREREQUISITE/COREQUISITE/ADVISORY
COURSE GRID FORM

Target Course: WST 145 Backflow Prevention Devices

Prerequisite Course: WST 144 Cross-Connection Controls

Instructions:
1) List exit competencies (skills) from Prerequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline ("upon completion of the course, the student should be able to…")
2) Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an "X" each needed skill.
3) Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:

1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

Entry Skills in Target Course	Exit Skills Provided by Prerequisite Course (Mark with an X if needed and indicate Prerequisite Course if more than one).	Degree of Importance (Rate 1 – 3)
1. Read and critically evaluate examples of cross-connection and backflow incidents.	X	1
2. Identify and explain the conditions of backsiphonage and backpressure.	X	1
3. Describe and give examples of direct and indirect cross-connections.	X	1
4. Explain backsiphonage due to the "Venturi Effect".	X	1
5. Calculate both absolute and gage pressures from equivalent water column height.	X	1
6. Distinguish between a pollutant and a contaminant.	X	1
7. Define the following terms as they pertain to applicable code and guidelines: approval, critical level, potable water, cross-connection, backflow, backpressure, backsiphonage, flood rim, auxiliary water supply, used water and air-gap separation.	X	1
8. Read, discuss, and respond to the various types of backflow preventer's and their appropriate application.	X	1
9. Identify and explain component features that distinguish each type of backflow prevention assembly.	X	1
10. Describe the installation requirements for each type of backflow preventer.	X	1
11. List the standard sizes and identification markings for each backflow.	X	1
12. List examples of improper connections to the potable water supply as applicable to the Uniform Plumbing Code.	X	1
13. List examples of plumbing fixtures utilizing a submerged inlet.	X	1
14. Summarize the responsibilities of the backflow assembly tester for testing and maintaining backflow preventers.	X	1
15. Compare and contrast the role and responsibility of the water supplier, health official and consumer for protecting the water system from backflow.	X	1
16. List the six major components of a water supplier's backflow prevention program as required by State law.	X	1
17. Identify and describe the operation of various field testing gage equipment.	X	1
18. Explain the "Degree of Hazard" as it applies to the facility survey.	X	1
19. Identify those hazards and facilities where backflow protection will usually be required.	X	1
20. Discuss the controversies over the backflow programs of isolation vs. containment.	X	1
21. Describe the various procedures of locating and documenting backflow hazards.	X	1
22. Write a personal report of cross-connection hazards found during a site survey and strategies for backflow protection of the potable water supply.	X	1