

**I. COURSE INFORMATION:**

A. Division: Technical  
Department: Water Supply Technology  
Course ID: WST 144  
Course Title: Cross-Connection Control  
Units: 3  
Lecture: 3 Hours  
Laboratory: None  
Prerequisite: None  
Corequisite: None  
Dept. Advisory: None

B. Catalog and Schedule Description:  
Intricacies of administering a cross-connection program and determining appropriate backflow prevention alternatives for protecting the drinking water system. Instruction toward certificate as a cross-connection control program specialist.

**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. Read and critically evaluate examples of cross-connection and backflow incidents.
- B. Identify and explain the conditions of backsiphonage and backpressure.
- C. Describe and give examples of direct and indirect cross-connections.
- D. Explain backsiphonage due to the "Venturi Effect".
- E. Calculate both absolute and gage pressures from equivalent water column height.
- F. Distinguish between a pollutant and a contaminant.
- G. 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.
- H. Read, discuss, and respond to the various types of backflow preventer's and their appropriate application.
- I. Identify and explain component features that distinguish each type of backflow prevention assembly.
- J. Describe the installation requirements for each type of backflow preventer.
- K. List the standard sizes and identification markings for each backflow.
- L. List examples of improper connections to the potable water supply as applicable to the Uniform Plumbing Code.
- M. List examples of plumbing fixtures utilizing a submerged inlet.
- N. Summarize the responsibilities of the backflow assembly tester for testing and maintaining backflow preventers.
- O. Compare and contrast the role and responsibility of the water supplier, health official and consumer for protecting the water system from backflow.
- P. List the six major components of a water supplier's backflow prevention program as required by State law.
- Q. Identify and describe the operation of various field testing gage equipment.
- R. Explain the "Degree of Hazard" as it applies to the facility survey.
- S. Identify those hazards and facilities where backflow protection will usually be required.
- T. Discuss the controversies over the backflow programs of isolation vs. containment.
- U. Describe the various procedures of locating and documenting backflow hazards.
- V. Write a personal report of cross-connection hazards found during a site survey and strategies for backflow protection of the potable water supply.

**IV. COURSE CONTENT:**

A. Historical Incidents

- B. Hydraulics of Backflow and Definitions
  - 1. Backsiphonage
  - 2. Backpressure
- C. Methods of Backflow Protection
  - 1. Acceptable – approved assemblies
  - 2. Unacceptable – cross-connection and devices
- D. Legal Aspects of Federal & State program
  - 1. Safe Drinking Water Act
  - 2. California Code of Regulations
- E. Legal Aspects of Local Program
  - 1. Ordinances
- F. Agency Program
  - 1. State law
  - 2. Plumbing Code
- G. Assembly Design, Specifications and Testing
- H. Degree of Hazard
  - 1. Contaminant
  - 2. Pollutant
- I. Strategies for Preventing Backflow
  - 1. Isolation
  - 2. Containment

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

- Lecture
- Class and/or small group discussion
- Critical evaluation of texts, newspapers, journal articles, and other printed research
- Critical evaluation of films, videotapes, audiotapes, or other media forms
- Classroom demonstrations
- Field trips
- 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 one chapter of the text per week - review objective questions at the end of each chapter.
- B. Writing Assignment. Writing assignments are required and may include (but are not limited to) the following: Write a short summary of what you observed on the field trip.
- C. Critical Thinking Assignment. Critical thinking assignments are required and may include (but are not limited to) the following: With the members of the assigned group, compile a cross-connection survey of the Campus water system. Prepare recommendations for the discussion.

**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):

- Portfolios
- Projects
- Written papers or reports

- Presentations (oral and visual)
- Work performance (internships or field work)
- Lab work
- Comprehensive examinations (cumulative finals or certifications)
- Peer evaluation
- Self evaluation
- Classroom participation
- Homework
- Other:
- Other:
- Other:

**VIII. TYPICAL TEXTS:**

- A. Manual of Cross-Connection Control, 10th Edition, University of Southern California, 2004
- B. Manual of Cross-Connection Control, 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:**

Scientific calculator