

San Bernardino Valley College  
Curriculum Approved: 12/08/2014  
Board Approval: 01/15/2015  
Unique course Identification Number:  
TOP Code: 0958.00 - Water and Wastewater Tech

## **I. CATALOG DESCRIPTION:**

### **A. Department Information:**

Division: Applied Technology, Transportation & Culinary Arts

Department: WATER SUPPLY TECHNOLOGY

Course ID: WST082

Course Title: Wastewater Collection II

Units: 3

Lecture: 3 contact hour(s) per week  
48 - 54 contact hours per semester

Prerequisite:

WST 081

### **B. Catalog Description:**

This course is designed to provide an in-depth understanding of the operation and maintenance of wastewater collector systems. The course focuses on the knowledge, skills, and abilities required to perform the essential duties of a skilled or journey level collection system maintenance technologist and prepares students to take the California Water Environment Association (CWEA) Collection System Certification exam at Grade II.

### **C. Schedule Description:**

This course focuses on the knowledge, skills, and abilities required to perform the essential duties of a skilled or journey level collection system maintenance technologist and prepares students to take the California Water Environment Association (CWEA) Collection System Certification exam at Grade II.

## **II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1**

## **III. COURSE OBJECTIVES FOR STUDENTS:**

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

- A. Identify the types of lift station components and diagram their functions
- B. List common types of lift stations and diagram their design, operation and maintenance
- C. Identify and compare the primary types of pumps used in a wastewater collection system
- D. Describe different cleaning methods and differentiate between hydraulic and mechanical cleaning methods
- E. Identify and assess the need for effective administration of a collection system

- F. Recognize and evaluate potential safety hazards in a collection system and practice safe working habits
- G. Perform basic mathematical calculations commonly required in a wastewater collection system
- H. Develop and implement an effective maintenance program for a wastewater collection system

#### **IV. COURSE CONTENT:**

##### **A. Lift Station Design and Operation**

- 1. Purpose of lift stations
  - a. Location
  - b. Types of lift stations
  - c. Wet well stations
  - d. Dry well stations
  - e. Lift station requirements
- 2. Components of a lift station
  - a. Wet wells
  - b. Bar racks
  - c. Dry wells
  - d. Electrical systems
  - e. Motors
  - f. SCADA
  - g. Pumps
  - h. Lift station valves
  - i. Ventilation and auxiliary equipment
- 3. Newly constructed lift station
  - a. Examination of prints
  - b. Pump station calibration
  - c. Inspection of lift station
  - d. Operation inspection
- 4. Operation of lift station
  - a. Lift station visits
  - b. Frequency of visits
  - c. Essential tasks during a visit
- 5. Lift station maintenance
  - a. Scheduling maintenance
  - b. Record Keeping

##### **B. Equipment maintenance**

- 1. Electrical equipment maintenance
  - a. Volts, amps, watts, and power requirements
  - b. Tools, meters and testers
  - c. Electrical system equipment
  - d. Motor control/supervisory control and electrical systems
- 2. Motors
  - a. Types
  - b. Nameplate data
  - c. Causes of failures
  - d. Insulation
  - e. Starters
  - f. Safety

- g. Troubleshooting
- 3. Pumps - types, parts and test procedures
- 4. Pump components
  - a. Impellers
  - b. Shafts
  - c. Packing
  - d. Mechanical seals
  - e. Bearings
  - f. Coupling
- C. Sewer rehabilitation
  - 1. Program formulation
  - 2. Scheduled component replacement
  - 3. Cathodic protection
  - 4. Maps, drawings, and records
    - a. Basic collection system maps
    - b. Plan and profile drawings
    - c. Map symbols
    - d. Inspection and maintenance records
    - e. Material safety data sheets
  - 5. Collection system components
    - a. Clean-outs
    - b. Flusher branches
    - c. Backflow prevention
    - d. Wyes and tees
    - e. Taps
    - f. Catch basins
    - g. Inverted siphons
    - h. Manholes
    - i. Flow diversion boxes
- D. Administration
  - 1. Need for effective administration
  - 2. Principles of administration
  - 3. Operating plan
    - a. Mission statement
    - b. Goals
    - c. Objectives and tasks/procedures
  - 4. Personnel
    - a. Calculating personnel required
    - b. Employment
    - c. Compensation
    - d. Training, information and certification
    - e. Safety
  - 5. Equipment and tools
    - a. Basis for requirements
    - b. Lease, purchase or contract
    - c. Equipment and tool requirements
    - d. Management
  - 6. Facilities
    - a. Yard
    - b. Shop

- c. Operator facility
  - d. Offices
- 7. Mapping
  - a. Importance
  - b. Reading maps for information
  - c. Examples of maps
  - d. GIS - Geographical information system
- 8. Uses of computers in wastewater collection agency
  - a. Management information system
  - b. Application of computers for system Operation and Management (O & M)
  - c. Record Keeping
- 9. Report writing
- 10. Public relations
- E. Inspection
  - 1. Pre-connect inspection
  - 2. Routine system inspection
  - 3. Rodding effectiveness inspection
  - 4. Main stoppage/problem solving
  - 5. Infiltration inflow testing
- F. Organization for system operation and maintenance
  - 1. Need for organization
  - 2. Organizational principles
  - 3. Organization of personnel
  - 4. Different repair and maintenance section within an organization
  - 5. Safety consideration
  - 6. Reorganization
  - 7. Establishing a maintenance program
  - 8. General performance program

**V. METHODS OF INSTRUCTION (May include any, but do not require all, of the following):**

- A. Lecture
- B. Distributed education
- C. Guest speakers
- D. Class and/or small group discussion
- E. Use of films, videotapes, or other media
- F. Use of written materials: texts, journals, etc.
- G. Field trips
- H. Instructor generated handouts

**VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:**

- A. Reading assignments are required and may include (but are not limited to) the following:

Read the chapter on pipe material. Be prepared to discuss, in class, the advantage and disadvantage of concrete, clay, ductile iron, steel, and thermoplastic pipes.

- B. Critical thinking assignments are required and may include (but are not limited to) the following:

A new sewer line is installed using a bubble level. For every foot of pipe installed, the level measures a quarter (1/4) inch of fall. Express "a quarter (1/4) inch of fall for every foot" in percent(%) slope.

- C. Writing assignments are required and may include (but are not limited to) the following:

While conducting a video inspection, a camera becomes stuck. Write down the steps you would take to continue your inspection.

## VII. METHODS OF EVALUATION

- A. Class participation
- B. Examinations
- C. Homework
- D. Presentations (oral or visual)
- E. Projects
- F. Written papers or reports
- G. Quizzes
- H. Cumulative finals or certifications

## VIII. TYPICAL TEXT(S):

- A. Kerri, Kenneth D. Operation and Maintenance of Wastewater Collection Systems Volume II. 7th ed. Office of Water Program, CSU Sacramento, 2010.
- B. Kerri, Kenneth D. Collection System: Methods for Evaluating and Improving Performance. 2nd ed. Office of Water Program, California State University, Sacramento, 2010.
- C. Parcher, Michael J. Wastewater Collection System Maintenance. 3rd ed. CRC Press, 1997.
- D. Rick Arbour and Associate. Basic Wastewater Collection Systems. 2nd ed. Minnesota Pollution Control Agency, 1995.

## IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

- A. A scientific calculator