

# Water Science

The Water Science Certificate Program is designed to serve those people employed or interested in employment in the water and/or wastewater fields and those who desire to upgrade their skills and/or receive certification from the State of California, the American Water Works Association, or the California Water Environment Association.

For further information, students should contact the Counseling Center at 965-0581, ext. 2285, or the Career Technical Education Office, ext. 2721.

## Program Options

Wastewater Collection  
Wastewater Treatment  
Water Distribution  
Water Treatment

## Certificates of Achievement

Water Science — Wastewater Collection Option  
Water Science — Wastewater Treatment Option  
Water Science — Water Distribution Option  
Water Science — Water Treatment Option

## Certificate Program

To receive the Certificate of Achievement in any of the program options, students must complete the required core courses for that option, one additional course from the Water Science elective list and one course from the elective support course list.

## Program Options: Required Core Courses

### Wastewater Collection (23-24 total units)

BMS 117 — Introductory Microbiology .....	3
MATH 100 — Elementary Algebra.....	5
WTRS 100 — Basic Wastewater Treatment .....	3
WTRS 112 — Water Quality Protection and Cross Connection Control .....	3
WTRS 113 — Water and Wastewater Hydraulics .....	3

*Plus, see Water Science electives and elective support courses.*

### Wastewater Treatment (20-21 total units)

BMS 117 — Introductory Microbiology .....	3
MATH 100 — Elementary Algebra.....	5
WTRS 100 — Basic Wastewater Treatment .....	3
WTRS 105 — Water Science Chemistry and Bacteriology ..	3

*Plus, see Water Science electives and elective support courses.*

### Water Distribution (26-27 total units)

BMS 117 — Introductory Microbiology .....	3
MATH 100 — Elementary Algebra.....	5
WTRS 101 — Water Distribution Systems .....	3
WTRS 110 — Basic Water Treatment .....	3
WTRS 112 — Water Quality Protection and Cross Connection Control .....	3
WTRS 113 — Water and Wastewater Hydraulics .....	3

*Plus, see Water Science electives and elective support courses.*

### Water Treatment (26-27 total units)

BMS 117 — Introductory Microbiology .....	3
MATH 100 — Elementary Algebra.....	5
WTRS 101 — Water Distribution Systems .....	3
WTRS 104 — Advanced Water Treatment.....	3
WTRS 105 — Water Science Chemistry and Bacteriology.....	3
WTRS 110 — Basic Water Treatment .....	3

*Plus, see Water Science electives and elective support courses.*

### Water Science Elective Courses

*Choose one course not listed as a required core course for the Certificate program selected:*

WTRS 100 — Basic Wastewater Treatment .....	3
WTRS 102 — Water Systems Instrumentation and Controls .....	3
WTRS 103 — Pump and Motor Operation and Maintenance .....	3
WTRS 112 — Water Quality Protection and Cross Connection Control .....	3

WTRS 113 — Water and Wastewater Hydraulics .....	3
WTRS 116 — Water and Wastewater Management .....	3

### Elective Support Courses

Choose one course:

ERTH 111 — Dynamic Earth <i>or</i> .....	3
ERTH 111H — Dynamic Earth, Honors .....	4
PHYS 101 — Conceptual Physics <i>or</i> .....	3
PHYS 101H — Conceptual Physic, Honors .....	4

## Course Descriptions

### WTRS 100 — Basic Wastewater Treatment (3) F

Study of the fundamentals of wastewater treatment, covering public health, water quality control, operation and maintenance of treatment facilities. Treatment processes include sedimentation, biofiltration, activated sludge, sludge digestion and chlorination.

### WTRS 101 — Water Distribution Systems (3) F, S

Designed for operators of water distribution systems. Covered are types of reservoirs, pipeline materials, pumps and appurtenances. The construction, installation and repair of water distribution facilities are discussed, as well as the administrative requirements in the operation of systems.

### WTRS 102 — Water Systems Instrumentation and Controls (3) F

Introduction to the principles and operation of instrumentation and control devices used in water and wastewater systems. Includes the measurement of both open and closed channel flow, differential pressure measurement, level transmitters, recording devices, data acquisition and telemetry transmission. Basic concepts of electrical theory are examined, as well as their application to electrical control circuits and SCADA systems.

### WTRS 103 — Pumps and Motors: Operation and Maintenance (3) F, S

Overview of pumps and motors used in the transmission of water. Emphasis is on the operation and maintenance of pumps, motors and their controls. Provides the maintenance technician with insights into the reasons for selection, as well as causes of failures and breakdowns. Application of hydraulics and pump curves are used for the selection and performance evaluation of pumps.

### WTRS 104 — Advanced Water Treatment (3) F, S

*Course Advisories: WTRS 100.*

Second-level water treatment course. Designed to augment and advance the topics addressed in WTRS 110, Basic Water Treatment. Topics covered are advanced water quality control during treatment, treatment plant operation and maintenance, regulations for water quality control, sludge handling and water reclamation.

### WTRS 105 — Water Science Chemistry and Bacteriology (3) F, S

*Course Advisories: WTRS 100 or WTRS 110.*

Review of the fundamentals of chemistry and bacteriology as applied to the treatment processes of water and wastewater. The emphasis is on understanding why certain reactions take place and the analytical techniques used in measuring water quality parameters. Includes demonstrations of laboratory procedures for physical, chemical and bacteriological examination of water.

### WTRS 106 — Groundwater Production and Protection (3) F, S

Study intended for operators of groundwater production and treatment facilities. Subjects include construction of wells, operation and maintenance of production wells, cost accounting methods and protection of groundwater resources. Also a review of the applicable state and federal regulations governing groundwater development and protection.

**WTRS 110 — Basic Water Treatment****(3) F**

Basic fundamental study of the aspects of operating a water supply system, treatment processing, microbiological control and chemical handling. Course can be used to qualify for state certification for Grades I, II and III Water Treatment Plant Operator's Certificate.

**WTRS 111 — Wastewater Collection****(3) F, S**

Designed for wastewater collection systems maintenance personnel. Included are sewer construction, cleaning methods, safety, elementary hydraulics, pipeline and manhole repair, equipment maintenance, public relations, communications and record-keeping.

**WTRS 112 — Water Quality Protection and Cross Connection Control****(3) F, S**

Introduction to water quality protection by cross connection control. Required for preparation to become a Certified Backflow Prevention Device Tester. A review of the *Uniform Plumbing Code* and hydraulic principles as applied to the protection of public water supplies from contamination by plumbing connections in private systems.

**WTRS 113 — Water and Wastewater Hydraulics****(3) F, S**

*Course Advisories: WTRS 100 or WTRS 110.*

Study of hydraulic principles as applied to the operation of water supply and wastewater systems. Topics include open channel flow, closed channel flow, pressure, force, flow measurement, pumping, head loss and treatment plant hydraulics.

**WTRS 114 — Advanced Wastewater Treatment****(3) F, S**

*Prerequisites: WTRS 110.*

Study of the advanced techniques of operating a wastewater treatment plant, including process applications, regulatory compliance, environmental issues, costs and multi-step problem-solving.

**WTRS 116 — Water and Wastewater Management****(3) F, S**

Study of supervisory and management skills necessary for the water professional to ensure that regulatory, health, safety and financial standards are met. Covered are planning, work methods, organization, personnel selection, training, discipline, motivation, leadership, safety, labor relations, public relations, politics and the ever-changing work environment.

**WTRS 117 — Wastewater Problem-Solving****(3) F**

Problem-solving as applied to primary, secondary and tertiary water treatment operations.