

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, contact department chair, Catherine Taylor at CTaylor@santabarbaraca.gov.

Program Options

Wastewater Collection
Wastewater Treatment
Water Distribution
Water Treatment

Program Student Learning Outcomes

PSLO1 — Become familiar with state and federal regulations for water and wastewater treatment

PSLO2 — Apply mathematical problem solving techniques to water/wastewater problems.

PSLO3 — Use scientific methods to discover, analyze and resolve water/wastewater issues.

PSLO4 — Become knowledgeable about processes and equipment used in water treatment, water distribution, waste water treatment and waste water collection.

PSLO5 — Learn the principles of managing a water/wastewater utility.

Department Offices

Douglas Hersh, *Dean* (hersh@sbcc.edu)

Catherine Taylor, *Chair* (CTaylor@santabarbaraca.gov)

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 Microbiology3

MATH 100 — Elementary Algebra.....5

WTRS 100 — Basic Wastewater Treatment3

WTRS 112 — Water Quality Protection and
Cross Connection Control3

WTRS 113 — Water and Wastewater Hydraulics3

See Water Science electives and elective support courses.

Wastewater Treatment (20-21 total units)

BMS 117 — Introductory Microbiology3

MATH 100 — Elementary Algebra.....5

WTRS 100 — Basic Wastewater Treatment3

WTRS 105 — Water Science
Chemistry and Bacteriology.....3

See Water Science electives and elective support courses.

Water Distribution (26-27 total units)

BMS 117 — Introductory Microbiology3

MATH 100 — Elementary Algebra.....5

WTRS 101 — Water Distribution Systems3

WTRS 110 — Basic Water Treatment3

WTRS 112 — Water Quality Protection and
Cross Connection Control3

WTRS 113 — Water and Wastewater Hydraulics3

See Water Science electives and elective support courses.

Water Treatment (26-27 total units)

BMS 117 — Introductory Microbiology3

MATH 100 — Elementary Algebra.....5

WTRS 101 — Water Distribution Systems3

WTRS 104 — Advanced Water Treatment.....3

WTRS 105 — Water Science
Chemistry and Bacteriology.....3

WTRS 110 — Basic Water Treatment3

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

Students must complete all department requirements for the certificates with a cumulative GPA of 2.0 or better.

Course Descriptions**WTRS 100 — Basic Wastewater Treatment****(3)**

Hours: 54 lecture

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)**

Hours: 54 lecture

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)**

Hours: 54 lecture

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)**

Hours: 54 lecture

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)**

Course Advisories: WTRS 100

Hours: 54 lecture

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)**

Course Advisories: WTRS 100 or 110

Hours: 54 lecture

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)

Hours: 54 lecture

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)

Hours: 54 lecture

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)

Hours: 54 lecture

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)

Hours: 54 lecture

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)

Course Advisories: WTRS 100 or 110

Hours: 54 lecture

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)

Prerequisites: WTRS 110

Hours: 54 lecture

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)

Hours: 54 lecture

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)

Hours: 54 lecture

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