

## Wastewater Collection Technology Education

A.A. DEGREE: 60 units

CERTIFICATE OF ACHIEVEMENT: 21 units

### DESCRIPTION

The Wastewater Collection Technology Education program is designed to prepare students to maintain and operate equipment; maintain, restore, monitor, evaluate and adjust collection systems; and maintain lift stations. Students completing the required courses for this degree will qualify to take nearly a dozen wastewater related certification examinations offered by the California Water Environment Association (CWEA). Although current State regulations do not require certification of wastewater collection system personnel, many public sector employers either require or prefer job applicants who have obtained the CWEA Wastewater Collection and Maintenance certifications.

### PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students will be able to:

- ▶ Define common terminology pertaining to collections system components, design and management as well as inspection and quality control.
- ▶ Identify the types and functions of pipes and fittings used in wastewater collection system design and management.
- ▶ Given a wastewater collection map book, identify pipeline dimensions, pipe construction materials, direction of flow and location of valves, services and lift stations.
- ▶ Describe in detail basic underground location and leak detection, trenching and shoring and backfill and compaction methods of construction used in the field.
- ▶ Describe the nine basic cleaning methods and basic principles involved in hydraulic and mechanical cleaning methods.
- ▶ List and describe the operation of common valves used in a wastewater collection system.
- ▶ Perform basic mathematical computations and conversions relating to wastewater collection systems, pressure, volume, velocity, chemical dosage and hydraulic and organic loading.

### REQUIRED CORE COURSES: (21 UNITS)

WTRM101	Introduction to Water, Wastewater Technology . . .	3
WTRM102	Beginning Water, Wastewater, Distribution Math . .	3
WTRM103	Introduction to Electrical and Instrumentation . . . .	3
	Processes . . . . .	3
WTRM104	Motors and Pumps, Operation and Maintenance . .	3
WTRM107	Beginning Wastewater Treatment Operations . . . .	3
WTRM113	Beginning Wastewater Collection . . . . .	3
WTRM116	Advanced Wastewater Collections . . . . .	3

### LIST A: SELECT ONE OF THE FOLLOWING (3 UNITS)

WTRM105	Water Distribution 1 . . . . .	3
WTRM106	Beginning Water Treatment Plant Operation . . . . .	3
WTRM109	Advanced Water Treatment Plant Operation . . . . .	3
WTRM110	Advanced Water/Wastewater/Distribution Math . . .	3
WTRM111	Advanced Wastewater Treatment Plant Operation .	3
WTRM112	Applied Hydraulics . . . . .	3
WTRM114	Laboratory Analysis for Water, Wastewater . . . . .	3
WTRM115	Supervision . . . . .	3

### LIST B: SELECT TWO OF THE FOLLOWING (4 - 8 UNITS)

WTRM118	Introduction to Occupational Health and Safety . .	3
WTRM121	Mechanical Maintenance . . . . .	3
WTRM132	Advanced Water Distribution . . . . .	3
WTRM133	Water Conservation . . . . .	3
WTRM134	Industrial Wastewater / Stormwater Management .	4
WTRM235	Pollution Prevention . . . . .	3
WTRM190	Occupational Work Experience/Water/Wastewater .	1-4
	Technology . . . . .	

### FOR CERTIFICATE COMPLETE CORE COURSES: 21 UNITS

### FOR ASSOCIATE DEGREE COMPLETE CORE (21 UNITS) , LIST A (3 UNITS) AND LIST B (4-8 UNITS), AND GENERAL EDUCATION REQUIREMENTS: (35 - 39 UNITS)

A student may complete the Gavilan College A.A./A.S. general education, the CSU-GE Breadth or the IGETC pattern, plus sufficient electives to meet a 60 unit total. See a counselor for details.

NOTE: A course may be used to satisfy both general education and major courses. See "Double Counting Rule".



## Wastewater Technology Education

A.A. DEGREE: 60 units

CERTIFICATE OF ACHIEVEMENT: 21 units

### DESCRIPTION

The Wastewater Technology Education program is designed to prepare students to operate or control an entire system of machines, often through the use of control boards, to transfer or treat wastewater. This includes monitoring gauges, dials or other indicators to make sure machines are working properly and troubleshooting and/or performing routine maintenance on equipment. Students completing the required courses for this degree will qualify to take the SWRCB certification examination for the Grade 1 Wastewater Plant Operator as well as nearly a dozen wastewater related certification examinations offered by CWEA.

### PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students will be able to:

- ▶ Describe wastewater collection system components.
- ▶ Identify the characteristics and sources of municipal sewage.
- ▶ Define wastewater collection system and wastewater treatment plant terminology.
- ▶ Describe the basic principles of conventional wastewater treatment.
- ▶ Describe the basic principles of conventional wastewater treatment.
- ▶ Compare and contrast wastewater treatment unit processes including preliminary, primary, secondary and tertiary treatment.
- ▶ Perform basic mathematical calculations and conversions relating to water flow, pressure, volume, velocity, chemical dosage and hydraulic and organic loading.
- ▶ Recognize and describe safety procedures applicable to service and operation of wastewater collection and treatment systems.

### PROGRAM REQUIREMENTS:

#### CORE COURSES (21 UNITS)

WTRM101	Introduction to Water, Wastewater Technology . . .	3
WTRM102	Beginning Water, Wastewater, Distribution Math . .	3
WTRM103	Introduction to Electrical and Instrumentation . . . . .	3
	Processes . . . . .	3
WTRM104	Motors and Pumps, Operation and Maintenance . .	3
WTRM107	Beginning Wastewater Treatment Operations . . . .	3
WTRM111	Advanced Wastewater Treatment Plant Operation	3
WTRM113	Beginning Wastewater Collection. . . . .	3

#### LIST A: ELECTIVES: (3 UNITS) SELECT ONE OF THE FOLLOWING:

WTRM109	Advanced Water Treatment Plant Operation . . . . .	3
WTRM110	Advanced Water/Wastewater/Distribution Math . . .	3
WTRM112	Applied Hydraulics . . . . .	3
WTRM114	Laboratory Analysis for Water, Wastewater . . . . .	3
WTRM115	Supervision . . . . .	3
WTRM132	Advanced Water Distribution . . . . .	3

#### LIST B: SELECT TWO OF THE FOLLOWING (4 - 8 UNITS)

WTRM116	Advanced Wastewater Collections. . . . .	3
WTRM118	Introduction to Occupational Health and Safety . .	3
WTRM121	Mechanical Maintenance . . . . .	3
WTRM133	Water Conservation . . . . .	3
WTRM134	Industrial Wastewater / Stormwater Management .	4
WTRM235	Pollution Prevention . . . . .	3
WTRM190	Occupational Work Experience/Water/Wastewater .	
	Technology . . . . .	1-4

#### FOR CERTIFICATE COMPLETE CORE COURSES: 21 UNITS

#### FOR ASSOCIATE DEGREE COMPLETE CORE (21 UNITS) , LIST A (3 UNITS) AND LIST B (4-8 UNITS), AND GENERAL EDUCATION REQUIREMENTS: (35 - 39 UNITS)

A student may complete the Gavilan College A.A./A.S. general education, the CSU-GE Breadth or the IGETC pattern, plus sufficient electives to meet a 60 unit total. See a counselor for details.

NOTE: A course may be used to satisfy both general education and major courses. See "Double Counting Rule".

## Water Distribution Technology Education

A.A. DEGREE: 60 units

CERTIFICATE OF ACHIEVEMENT: 21 units

### DESCRIPTION

The Water Distribution Technology Education program is designed to teach students the methods, processes, technology and current practices involved in operating and maintaining modern, complex water distribution systems. Students who satisfactorily complete the required courses for this degree will qualify to take the CDPH Grade D-1 through D-5 Water Distribution Operator examinations required to obtain certification and employment with a water district.

### PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students will be able to:

- ▶ Identify sources and characteristics of water common to water distribution systems.
- ▶ Compare and contrast the different types of water distribution systems currently in use.
- ▶ Identify drinking water public health hazards and water quality standards common to the industry.
- ▶ Utilize calculations and conversions to determine water flow, pressure, volume, velocity and force and chemical dosage used in water distribution systems.
- ▶ Identify and compare methods used to handle, install and repair water distribution pipe.
- ▶ Explain the principles of pump operation for the types of pumps used in water distribution systems; including common problems, necessary adjustments and typical packing gland problems.
- ▶ Explain the electrical principles involved in control circuits common to water distribution systems.
- ▶ Explain the required safe handling and storage of chlorine used in water distribution systems.
- ▶ Check and utilize water maps and drawings to determine location, type and characteristics of water distribution systems.
- ▶ Specify necessary procedures needed to safely complete field work in a water distribution system.
- ▶ Compare and contrast factors considered in the selection of pipe and different types of water meters.
- ▶ Demonstrate how to read meters and calculate the meters accuracy.

### CORE REQUIREMENTS: (21 UNITS) UNITS: (21 UNITS)

WTRM101	Introduction to Water, Wastewater Technology . . .	3
WTRM102	Beginning Water, Wastewater, Distribution Math . .	3
WTRM103	Introduction to Electrical and Instrumentation . . . .	3
	Processes . . . . .	3
WTRM104	Motors and Pumps, Operation and Maintenance . .	3
WTRM105	Water Distribution 1 . . . . .	3
WTRM106	Beginning Water Treatment Plant Operation . . . .	3
WTRM132	Advanced Water Distribution . . . . .	3

### LIST A: (3 UNITS) SELECT ONE OF THE FOLLOWING

WTRM107	Beginning Wastewater Treatment Operations . . . .	3
WTRM109	Advanced Water Treatment Plant Operation . . . .	3
WTRM110	Advanced Water/Wastewater/Distribution Math . . .	3
WTRM111	Advanced Wastewater Treatment Plant Operation .	3
WTRM112	Applied Hydraulics . . . . .	3
WTRM113	Beginning Wastewater Collection . . . . .	3
WTRM114	Laboratory Analysis for Water, Wastewater . . . . .	3
WTRM115	Supervision . . . . .	3

### LIST B: (4 - 8 UNITS) SELECT TWO OF THE FOLLOWING

WTRM116	Advanced Wastewater Collections . . . . .	3
WTRM118	Introduction to Occupational Health and Safety . .	3
WTRM121	Mechanical Maintenance . . . . .	3
WTRM133	Water Conservation . . . . .	3
WTRM134	Industrial Wastewater / Stormwater Management .	4
WTRM235	Pollution Prevention . . . . .	3
WTRM190	Occupational Work Experience/Water/Wastewater .	1-4
	Technology . . . . .	1-4

### FOR CERTIFICATE COMPLETE CORE COURSES: 21 UNITS

### FOR ASSOCIATE DEGREE COMPLETE CORE (21 UNITS) , LIST A (3 UNITS) AND LIST B (4-8 UNITS), AND GENERAL EDUCATION REQUIREMENTS: 35 - 39 UNITS

A student may complete the Gavilan College A.A./A.S. general education, the CSU-GE Breadth or the IGETC pattern, plus sufficient electives to meet a 60 unit total. See a counselor for details.

NOTE: A course may be used to satisfy both general education and major courses. See "Double Counting Rule".

## Water Resource Management

A.A. DEGREE: 60 units

CERTIFICATE OF ACHIEVEMENT: 25-28 units

### DESCRIPTION

The Water Resources Management degree program is designed to prepare students for employment by municipal drinking water and wastewater treatment departments or industrial treatment facilities. Careers in water/wastewater technology generally involve the administration, operation and maintenance of both drinking water and wastewater treatment facilities as well as distribution and collection systems. Gavilan's Water Resources Management Program provides educational courses that prepare students for careers in Water Resources Management. Courses prepare students for certification examinations administered by the State of California as well as those administered by professional associations within the water and wastewater industry. Current instructors are experienced water and wastewater professionals, expert and up-to-date in best-of-breed industry practices. Classes are built around practical examples of real-world scenarios, demonstrations, and field trips whenever possible to maximize understanding of subject matter. Internships are available, too, through Cooperative Work Experience.

### PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students will be able to:

- ▶ Follow safe practices in the laboratory and in plant operations.
- ▶ Apply chemical, microbiological, and mechanical knowledge and skills to maintain proper water and wastewater plant operations.
- ▶ Apply math and hydraulics skills in proper water and wastewater plant, collection system, and distribution system operations.
- ▶ Identify regulations and operate the plant accordingly.
- ▶ Be able to pass the California licensure examination in the water industry.
- ▶ Interact effectively in oral and written communications.
- ▶ Use computers in water and wastewater plant operation.
- ▶ Demonstrate work ethic and model professional interaction with the public.

### CORE COURSES (18 UNITS)

WTRM101	Introduction to Water, Wastewater Technology . . .	3
WTRM102	Beginning Water, Wastewater, Distribution Math . .	3
WTRM103	Introduction to Electrical and Instrumentation . . . . .	3
	Processes . . . . .	3
WTRM105	Water Distribution 1 . . . . .	3
WTRM106	Beginning Water Treatment Plant Operation . . . . .	3
WTRM107	Beginning Wastewater Treatment Operations . . . . .	3

### ELECTIVES: SELECT ONE OF THE FOLLOWING: (3 UNITS)

WTRM108	Water Distribution 2 . . . . .	3
WTRM109	Advanced Water Treatment Plant Operation . . . . .	3
WTRM110	Advanced Water/Wastewater/Distribution Math . . .	3
WTRM111	Advanced Wastewater Treatment Plant Operation .	3
WTRM112	Applied Hydraulics . . . . .	3
WTRM113	Beginning Wastewater Collection. . . . .	3
WTRM114	Laboratory Analysis for Water, Wastewater . . . . .	3
WTRM115	Supervision . . . . .	3

### ELECTIVES: SELECT TWO OF THE FOLLOWING (4 - 7 UNITS)

WTRM104	Motors and Pumps, Operation and Maintenance . .	3
WTRM116	Advanced Wastewater Collections. . . . .	3
WTRM117	Water Use Efficiency Practitioner . . . . .	3
WTRM118	Introduction to Occupational Health and Safety . .	3
WTRM119	Industrial Wastewater Management & Treatment . .	3
WTRM120	Pollution Prevention / Storm Water Management . .	3
WTRM121	Mechanical Maintenance . . . . .	3
WTRM190	Occupational Work Experience/Water/Wastewater .	1- 4
	Technology . . . . .	

### FOR CERTIFICATE COMPLETE CORE COURSES: 18 UNITS PLUS LIST A AND B REQUIREMENTS,

### FOR ASSOCIATE DEGREE COMPLETE CORE (18 UNITS) , LIST A (3 UNITS) AND LIST B (4-8 UNITS), AND GENERAL EDUCATION REQUIREMENTS: 35 - 39 UNITS

A student may complete the Gavilan College A.A./A.S. general education, the CSU-GE Breadth or the IGETC pattern, plus sufficient electives to meet a 60 unit total. See a counselor for details.

NOTE: A course may be used to satisfy both general education and major courses. See "Double Counting Rule".

## Water Technology Education

A.A. DEGREE: 60 units

CERTIFICATE OF ACHIEVEMENT: 28-32 units

### DESCRIPTION

The Water Technology Education program is designed to teach students the key steps, processes, and current technology involved in operating modern water treatment plants. Students who satisfactorily complete the required courses in this degree will qualify to take the California Department of Public Health (CDPH) Grade T-1 and T-2 Water Treatment Plant Operator examinations required for certification and employment at water treatment plants.

### PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students will be able to:

- ▶ Identify in detail characteristics and sources of ground water and surface water supplies and explain the effects on quality of geological formations, stratifications and watershed management.
- ▶ Compare and contrast the basic principles of each water treatment process and list them in order performed.
- ▶ Identify and classify water distribution system components.
- ▶ Explain pump cavitation, corrosion, cross-connection, air valves, head loss and main flushing in relation to water and wastewater collection, distribution and treatment.
- ▶ Explain and prepare a plan for the use of chlorine including the characteristics of and methods for storing, feeding and measuring chlorine.
- ▶ Determine the methods used for coagulation, flocculation and sedimentation.
- ▶ Compare and contrast the six basic water quality parameters and explain in detail microbiological and chemical components.
- ▶ Demonstrate the regulations for monitoring water quality and performing water treatment.
- ▶ Perform basic mathematical calculations and conversions relating to water flow, pressure, volume, velocity, chemical dosage and hydraulic and organic loading.
- ▶ Determine appropriate safety procedures applicable to service and operation of water treatment and distribution systems.

### CORE COURSES: (21 UNITS)

WTRM101	Introduction to Water, Wastewater Technology . . .	3
WTRM102	Beginning Water, Wastewater, Distribution Math.	3
WTRM103	Introduction to Electrical and Instrumentation . . .	3
	Processes. . . . .	3
WTRM104	Motors and Pumps, Operation and Maintenance	3
WTRM105	Water Distribution 1 . . . . .	3
WTRM106	Beginning Water Treatment Plant Operation . . . .	3

WTRM109	Advanced Water Treatment Plant Operation . . . .	3
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### RESTRICTED ELECTIVES/ LIST A: SELECT ONE OF THE FOLLOWING (3 UNITS)

WTRM107	Beginning Wastewater Treatment Operations . . .	3
WTRM110	Advanced Water/Wastewater/Distribution Math . .	3
WTRM111	Advanced Wastewater Treatment Plant Operation	3
WTRM112	Applied Hydraulics. . . . .	3
WTRM113	Beginning Wastewater Collection . . . . .	3
WTRM114	Laboratory Analysis for Water, Wastewater . . . .	3
WTRM115	Supervision. . . . .	3
WTRM132	Advanced Water Distribution . . . . .	3

### LIST B: SELECT TWO OF THE FOLLOWING)UNITS: (4 - 8 UNITS)

WTRM116	Advanced Wastewater Collections. . . . .	3
WTRM118	Introduction to Occupational Health and Safety . .	3
WTRM121	Mechanical Maintenance . . . . .	3
WTRM133	Water Conservation . . . . .	3
WTRM134	Industrial Wastewater / Stormwater Management .	4
WTRM235	Pollution Prevention . . . . .	3
WTRM190	Occupational Work Experience/Water/Wastewater .	1- 4
	Technology. . . . .	

### FOR CERTIFICATE COMPLETE CORE COURSES: 21 UNITS

### FOR ASSOCIATE DEGREE COMPLETE CORE (21 UNITS) , LIST A (3 UNITS) AND LIST B (4-8 UNITS), AND GENERAL EDUCATION REQUIREMENTS: 35 - 39 UNITS

A student may complete the Gavilan College A.A./A.S. general education, the CSU-GE Breadth or the IGETC pattern, plus sufficient electives to meet a 60 unit total. See a counselor for details.

NOTE: A course may be used to satisfy both general education and major courses. See "Double Counting Rule".