WATER TECHNOLOGY

EPA State Environmental Training Program

Associate of Water Technology Degree

Certificate of Completion

The Water Technology program is an award-winning, up-to-date technical training opportunity that will open doors to a career anywhere in the United States. Graduates of this program have found work in New Mexico, Colorado, Texas, Arizona, California, Vermont, New Hampshire, Iraq, and Puerto Rico. More than 400 graduates have begun careers in the water field, working in such diverse areas as the semiconductor industry, the food processing industry, aerospace industry, electrical power industry, city water and wastewater departments, municipal or contract analytical laboratories, water reuse or recycling plants, metal plating companies, engineering consulting firms, and state planning offices.

While jobs are widely available, training programs like this one are rare. As the treatment of water becomes more technical, municipalities and industries rely on training programs to fill their needs. Students in this program learn how to clean water to make it safe for drinking and how to purify water to a high quality for use in computer chip manufacturing, food processing, or steam generation. They will also learn how to treat wastewater so it can be safely returned to the environment or reclaimed for beneficial use. Instruction also includes maintaining equipment such as pumps, motors, valves, and chemical feeders; laboratory testing and analysis; water and wastewater chemistry and microbiology; applied math; and some basics of supervising and managing a water utility, including budgets, preventive maintenance schemes, and billing. Various course assignments requiring laboratory data sheets, simple process control spreadsheets, and term papers enable students to sharpen their computer and writing skills. General studies in basic algebra, speech, and technical writing round out the curriculum.

Whether taking classes or working on a job site, students enrolled in this program will be required to perform the same job duties and be able to meet the same physical requirements that they will as graduates in the field. Depending where they find employment, graduates may be required to

- work in inclement weather,
- lift up to 50 pounds from the ground,
- work safely around hazardous chemicals using appropriate safety equipment such as a self-contained breathing apparatus,
- work safely in confined spaces,
- ascend and descend stairs and ladders to reach equipment,
- work safely around heavy equipment,
- work safely and effectively on uneven surfaces, and
- stand for long periods of time on concrete floors.

Some positions in the field require certification and the licensing agency may not provide special testing accommodations.

Opportunities for students to gain new knowledge and skills in operations, maintenance, and laboratory areas are provided through classroom training, hands-on laboratories, field trips, guest lectures, and training on the program's own water and wastewater plants.

Before graduating, students will spend a minimum of 180 hours at an internship site with a municipality or industry. Students have found co-ops at water and wastewater plants and laboratories in Albuquerque, El Paso, Las Cruces, Socorro, Hobbs, Silver City, Mesilla, and Glorieta, and with industries such as Intel and Kurita America.

Financial aid beyond loans, grants, work-study monies, and DACC scholarships include nine private scholarships specifically for Water Technology students:

1. Max Summerlot Memorial Scholarship, given to a water technology student in his or her second year in the program;
2. Cynthia Hiers-Robinson Current-Use Scholarship;
3. Pruett Family Water Technology Scholarship;
4. Col. Raymond Madson Memorial Scholarship
5. two scholarships presented by the New Mexico Water and Wastewater Association;
6. one scholarships presented by the Southwest Section of the New Mexico Water and Wastewater Association; and
7. two scholarships presented by the Central Section of the New Mexico Water and Wastewater Association.

NOTE: Students must achieve a cumulative grade-point average of 2.0 with a final grade of *C*- or better in ENGL 1110G Composition I and a final grade of C- or better in all required WATR courses. The remaining courses are applicable toward the bachelor of applied studies degree offered by the NMSU College of Extended Learning. At least 36 hours of the technical requirements are applicable toward the bachelor's degree in agricultural and extension education offered by the College of Agricultural, Consumer and Environmental Sciences at New Mexico State University.

Water Technology - Associate of Water Technology (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/water-technology/water-technology-aas/)

Water Technology - Certificate of Completion (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/water-technology/water-technology-certificate-completion/)

WATR 120. Introduction to Water Systems
3 Credits (3)
Introduction to and theory of groundwater sources, production, treatment, and distribution.
Learning Outcomes
1. Effectively present technical information through oral communication.
2. Effectively work as a team.
3. Identify appropriate process changes for different water processes.

WATR 130. Wastewater Collection and Basic Treatment Systems
3 Credits (3)
Introduction to wastewater characteristics, collection, and basic treatment operations.
Learning Outcomes
1. Effectively present technical information through oral and written communication.
2. Identify appropriate process changes for different water processes.

WATR 140. Applied Water and Wastewater Math I
3 Credits (3)
Introduction to basic water and wastewater mathematics, flows through distribution networks and collection systems, and fundamentals of flow measurement.
Prerequisite: CCDM 114 N with a C- or better, or equivalent.
Learning Outcomes
1. Apply problem solving techniques to solve math problems and career related technical problems.
2. Apply estimation techniques to solve problems and check answers for reasonableness.
3. Analyze and solve problems using basic technical tools and techniques.
4. Demonstrate the ability to work as a member of a team to solve problems and complete projects.
5. Display the positive attitude and good work habits necessary for successful employment.

WATR 160. Systems Maintenance
4 Credits (2+4P)
Basic tools, equipment, maintenance schedules, chlorinator trouble-shooting, and chlorine safety. Hands-on training with valves, pumps, meters and chlorination equipment. May be repeated up to 4 credits.
Learning Outcomes
1. Effectively work as part of a team.
2. Identify cause(s) of mechanical/equipment/system failure.
3. Identify corrective actions for mechanical/equipment/system failure.

WATR 175. Programmable Logic Controllers
2 Credits (2)
This course will introduce students to electrical safety, theory, and the function, operations, programming and troubleshooting of the PLC controlling common electrical components utilized in control circuits associated with the water and wastewater industry.
Learning Outcomes
1. Identify corrective actions for equipment failure.
2. Utilize knowledge to develop a treatment facility schematic/design.
3. Identify the sampling points for data collection.
4. Perform operational duties safely.

WATR 180. Water Chemistry
3 Credits (3)
Basic chemistry with applications to water and wastewater analysis.
Prerequisite: CCDM 114 N grade of C- or better, or consent of instructor.
Learning Outcomes
1. Apply critical thinking (includes communicating effectively, applying numerical information appropriately, problem solving effectively and demonstrating appropriate technical skills).
2. Identify information/data required to complete calculations.
3. Use mathematics and problem-solving techniques to analyze and find answers to work- related technical problems.

WATR 182. Water Chemistry Analysis
1 Credit (3P)
Beginning water and wastewater laboratory analysis including gravimetric, volumetric, and quality control techniques.
Prerequisite: Grade of C- or better in CCDM 114 N or equivalent, or consent of instructor.
Learning Outcomes
1. Students will be able to use written communication to effectively present technical information.
2. Students will be able to conduct appropriate lab analysis.

WATR 190. Water and Wastewater Microbiology
3 Credits (3)
Overview of microorganisms associated with water and wastewater. Growth and reproduction, energy production, and methods of counting.
Prerequisite: Grade of C- or better in WATR 130 and WATR 180, or consent of instructor.
Learning Outcomes
1. Effectively present technical information through oral and written communication.
2. Effectively work as part of a team.
3. Evaluate treatment processes utilizing collected or given data.
4. Identify appropriate process control changes for different treatment processes based on process evaluation.
5. Identify correct operational parameters for treatment processes.
6. Identify sampling points for data collection from treatment processes.
7. Integrate multiple, related concepts to determine appropriate operational response.

WATR 192. Water and Wastewater Microbiological Analysis
1 Credit (3P)
Introduction to water and wastewater treatment operational tests such as BODs, solids testing, activated sludge control tests, use of microscope, and bacteriological techniques.
Prerequisite: Grade of C- or better in WATR 130 and WATR 182, or consent of instructor.
Learning Outcomes
1. Identify information/data required to complete calculations and accurately perform them.
2. Identify correct operational parameters for treatment processes.
3. Identify sampling points for data collection from treatment processes.
4. Demonstrate correct/accurate laboratory technique.
5. Perform appropriate lab analyses with acceptable accuracy.
6. Perform operational/laboratory duties safely.

WATR 200. Internship
3-5 Credits
On-the-job training/work experience with municipalities or industries, working in water or wastewater treatment plants, high purity water plants, industrial waste plants, distribution systems, or wastewater collection systems. May be repeated up to 5 credits.
Learning Outcomes
1. Be able to successfully perform on the job duties of a Water or Waste Water technician.
2. Be able to evaluate treatment processes utilizing collected or given data.
3. Be able to successfully work as part of a water or waste water operations team.
4. Demonstrate knowledge of applicable regulations.

WATR 220. Water Treatment Systems
3 Credits (3)

Theory of water systems operation including surface water treatment, fluoridation, sodium zeolite softening, corrosion control, iron removal, various filtration methods, and overview of SDWA.
Prerequisite: Grade of C- or better in WATR 180 and WATR 182, or consent of instructor.

Learning Outcomes

1. Effectively present technical information through written and oral communication.
2. Evaluate treatment processes utilizing collected or given data.
3. Identify appropriate process control changes for different treatment processes based on process evaluation.
4. Identify information/data required to complete calculations and accurately perform them.
5. Identify correct operational parameters for treatment processes.
6. Identify sampling points for data collection from treatment processes.
7. Demonstrate knowledge of applicable regulations and their application.
8. Integrate multiple, related concepts to determine appropriate operational response.

WATR 222. Water Systems Operation
1 Credit (3P)
Operations of various water treatment systems including surface water treatment, sodium zeolite softeners, and various filtration methods.
Prerequisite: C- or better in WATR 220, or consent of instructor.

Learning Outcomes

1. Effectively present technical information through written and oral communication.
2. Evaluate treatment processes utilizing collected or given data.
3. Identify appropriate process control changes for different treatment processes based on process evaluation.
4. Identify information/data required to complete calculations and accurately perform them.
5. Identify correct operational parameters for treatment processes.
6. Identify sampling points for data collection from treatment processes.
7. Demonstrate knowledge of applicable regulations and their application.
8. Integrate multiple, related concepts to determine appropriate operational response.

WATR 230. Advanced Wastewater Treatment
4 Credits (4)
Calculations and operations involved in wastewater and water reclamation plants.
Prerequisite: Grade of C- or better in WATR 140, WATR 190, and WATR 192, or consent of instructor.

Learning Outcomes

1. Students will be able to use written communication to effectively present technical information.
2. Students will be able to conduct appropriate lab analysis.

WATR 232. Wastewater Systems Operations
1 Credit (3P)
Operation of pretreatment, primary, and biological treatment units.
Prerequisite: Grace of C- or better in WATR 230, or consent of instructor.

Learning Outcomes

1. Effectively present technical information through written and oral communication.
2. Evaluate treatment processes utilizing collected or given data.
3. Identify appropriate process control changes for different treatment processes based on process evaluation.
4. Evaluate invalid labs analysis to determine corrective actions.
5. Identify information/data required to complete calculations and accurately perform them.
6. Identify correct operational parameters for treatment processes.
7. Identify sampling points for data collection from treatment processes.
8. Demonstrate correct/accurate laboratory technique.
9. Perform appropriate lab analysis with acceptable accuracy. 1
10. Perform appropriate process control changes for various treatment processes. 1
11. Perform operational/laboratory duties safely. 1
12. Demonstrate knowledge of applicable regulations and their application. 1
13. Integrate multiple, related concepts to determine appropriate operational response.

WATR 240. Advanced Water and Wastewater Math II
3 Credits (2+2P)
Advanced water and wastewater mathematics. Flow measurement. Systems head and pump curves. May be repeated up to 3 credits.
Prerequisite: Grade of C- or better in WATR 140.

Learning Outcomes

1. Identify information/data required to complete calculations and accurately perform them.
2. Use written communication to effectively present technical information.

WATR 250. Municipal Systems Management
4 Credits (4)
Management of water utility systems including laws, finance, records, and safety.
Prerequisite: Grade of C- or better in WATR 120 and WATR 130.

Learning Outcomes

1. Effectively work as a team leader.
2. Evaluate responsibilities of utility management.
3. Identify appropriate planning, organization, and recordkeeping.
4. Evaluate appropriate practices for interviewing, hiring, supervising, and disciplining employees.
5. Evaluate and identify the development of policies and procedures for dealing with harassment, grievances, and violence in the workplace.
6. Implement effective oral and written communication, including formal and informal public relations.
7. Identify and implement assessing the financial strength and stability of a water/wastewater utility, budgeting and fund capital improvements.

WATR 270. Special Topics
1-4 Credits
Specific subjects to be announced in the Schedule of Classes. May be repeated for a maximum of 12 credits.

WATR 275. Certification Review
3 Credits (3)

Review of water and wastewater plant operations and laws in preparation for state certification exams. Restricted to Community Colleges campuses only.
Prerequisite: WATR 120, WATR 130, WATR 140, WATR 160.
Learning Outcomes

1. Identify appropriate process changes for different wastewater processes.
2. Identify appropriate process changes for different water processes.
3. Identify corrective actions for equipment failure.
4. Identify analytical data required to complete process control calculations.
5. Accurately complete water process control calculations.
6. Accurately complete wastewater process control calculations.
7. Evaluate operational problems.
8. Identify the sampling points for data collection.

WATR 285. High Purity Water Treatment Systems
3 Credits (3)
Principles of high purity water production including microfiltration, ultra-filtration, reverse osmosis, and deionization.
Prerequisite: Grade of C- or better in WATR 220.
Learning Outcomes

1. Effectively present technical information through oral and written communication.
2. Evaluate treatment processes utilizing collected or given data.
3. Identify appropriate process control changes for different treatment processes bason on process evaluation.
4. Identify information/data required to complete calculations and accurately perform them.
5. Identify correct operational parameters for treatment processes.
6. Identify sampling points for data collection from treatment processes.
7. Integrate multiple, related concepts to determine appropriate operational response.

WATR 287. Advanced Water Chemistry Analysis
3 Credits (6P)
Sampling techniques, analysis, and evaluation of potable water contaminants using gravimetric, volumetric, spectrophotometric, and other instrumentation methods.
Prerequisite/Corequisite: WATR 285. Restricted to Community Colleges campuses only.
Learning Outcomes

1. Evaluate invalid labs analysis to determine corrective actions.
2. Identify information/data required to complete calculations.
3. Accurately perform calculations.
4. Demonstrate correct/accurate laboratory technique.
5. Demonstrate correct/accurate laboratory technique.
6. Perform operational/laboratory duties safely.

WATR 290. Advanced Wastewater Microbiology and Chemistry
3 Credits (3)
Covers NPDES permits and DMR calculations and reporting; 503 sludge regs, including pathogen and vector attraction reduction and pollutants; wetlands, composting, and wastewater treatment ponds microbiology; activated sludge bulking and foaming microbiology and treatment; and use of selector to remove nutrients and prevent the growth of filamentous bacteria.
Prerequisite: Grade of C- or better in WATR 190 and WATR 192.
Learning Outcomes

1. Effectively present technical information through oral and written communication.
2. Evaluate treatment processes utilizing collected or given data.
3. Identify appropriate process control changes for different treatment processes based on process evaluation.
4. Identify cause(s) of mechanical/equipment/system failure and identify the corrective actions to take.
5. Identify information/data required to complete calculations and accurately perform them.
6. Identify correct operational parameters for treatment processes.
7. Identify sampling points for data collection from treatment processes.
8. Demonstrate knowledge of applicable regulations and their application.
9. Integrate multiple, related concepts to determine appropriate operational response.

WATR 292. Advanced Wastewater Analysis
3 Credits (6P)
Covers sampling techniques, analysis, and evaluation of wastewater contaminants using gravimetric, volumetric, spectrophotometric, and other instrumentation methods.
Prerequisite: Grade of C- or better in WATR 190 and WATR 192.
Learning Outcomes

1. Perform titrations and document the necessary quality control.
2. Perform microbiological analysis and document the necessary quality control.
3. Perform spectrophotometric analysis and document the necessary quality control.
4. Perform BOD/COD analysis and document the necessary quality control.
5. Complete performance evaluation samples satisfactorily.
6. Effectively present technical information through oral and written communication.
7. Identify information/data required to complete calculations and accurately perform calculations.
8. Demonstrate knowledge of applicable regulations and their application.

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