

# WATER QUALITY MGMT (WQMS)

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## **WQMS 100 Introduction to Water Quality3 Credits**

Introduction to the water and wastewater treatment field and the various applied science concepts that are used to operate, maintain and monitor water quality; includes the hydrological cycle, water sources, hydraulics, ecosystems, pollution, water chemistry, water calculations, microbiological aspects of water and water quality control.

## **WQMS 105 Specific Calculations for Water Quality Management4 Credits**

An in-depth study of the calculations associated with water and wastewater treatment; includes dimensional analysis, manipulation of conversion factors, geometric figures, velocities, detention time, surface loading, filtration and backwash rates, porosity, weir overflow rates, efficiencies, weight of dry solids, sludge pumping, settleable solids, volatile solids, mean cell residence times, settleability, disinfection and chemical dosage as relating to trickling filters, ponds, RBC, and activated sludge.

## **WQMS 106 Mechanical/Physical Treatment3 Credits**

Introduction to wastewater treatment; includes the technician and their responsibility, effects of waste discharges, natural cycles, solids in waste discharges, natural cycles, solids in wastewater, NPDES permits, collection systems, pretreatment, primary treatment, secondary treatment, advanced treatment, flow measuring, solids handling and disposal.

## **WQMS 109 Water Distribution3 Credits**

Purpose, selection and location of water storage facilities and the operation and maintenance of related equipment; includes storage facilities and capabilities, booster pumps, water mains and appurtenances, joints, pipe protection and installation, valves, fittings, hydrants, quality standards, contaminants and degradation inspection and monitoring, system troubleshooting, surveillance, cross connections, pressure main breaks, corrosion control, disinfection and emergency planning.

## **WQMS 116 Conventional Surface Water Treatment3 Credits**

Coagulation, flocculation, sedimentation, filtering, corrosion and taste and odors; includes descriptions, operating procedures, associated calculations, start-up and shut down procedures, laboratory tests, troubleshooting, maintenance, safety and records.

## **WQMS 118 Wastewater Collection Systems3 Credits**

Purpose, components and design of collection systems; including safety procedures, inspection and testing, pipeline cleaning and maintenance, underground repair, lift stations and sewer rehabilitation.

## **WQMS 119 Basic Water Quality Analysis4 Credits**

Relation of laboratory control tests to the chemistry of water and wastewater treatment. Students gain the skills and techniques to operate within a laboratory; includes laboratory equipment and instrumentation-identification, set-up and calibration, safety, sample collection and preservation, written reports and laboratory tests. Laboratory testing includes hardness, alkalinity, dissolved oxygen, biochemical oxygen demand, chlorine residual, pH, phosphorus, dissolved solids, total solids, suspended solids, turbidity, Langlier index, fluoride and biomonitoring.

## **WQMS 124 Water Certification Review for Class C & D3 Credits**

Preparation of students for the operator's certification test in water at the C and D level. Topics include water principles, mathematics, hydraulics, water filtration, chemical treatment, source control, basic operations, Colorado Primary Drinking Water Regulations, housekeeping, and laboratory analysis.

## **WQMS 125 Wastewater Certification Review for Class C & D3 Credits**

Preparation of students for the operator's certification test in wastewater at the C and D level. Topics include wastewater principles, mathematics, hydraulics, conventional treatment of wastewater, wastewater sedimentation, Colorado Water Quality Control Act, biological treatment of wastewater, effluent standards for wastewater, sludge handling and disposal, disinfection, pumps, safety, housekeeping, and laboratory analysis.

## **WQMS 126 Safety and Security Systems3 Credits**

Exploration of all applied safety aspects in the water and wastewater industry. Topics include development of safety policies and programs, job safety orientation, driving practices, CPR/First Aid, Permit Required Confined Spaces (PRCS), air monitoring and displacement requirements, treatment equipment, construction vehicles/equipment, chlorine and other chemical handling, and security and safety standards as determined by the Bioterrorism Preparedness Act of 2002.

## **WQMS 127 Water Quality Utility Management3 Credits**

Introduction to the fundamental business practices that are utilized in managing a water or wastewater utility. Topics include the functions of a manager, planning, organizing, staffing, public relations, financial management, regulatory compliance, safety, and operations and maintenance from a management perspective.

## **WQMS 150 Troubleshooting in Water Quality3 Credits**

Exploration of troubleshooting practices and procedures for chemical adjustments, equipment failures (electrical, mechanical, pneumatic and hydraulic), source contamination, system control procedures, and redundancies.

## **WQMS 200 Hydraulics for Water Quality Management4 Credits**

Introduction to the mathematical principles of density, specific gravity, pressures, horsepower and energy costs, velocities, weirs, parshall flumes, venturi meters, California Pipe method, flows from open end pipes, settling velocities and classification of flows.

**Terms Typically Offered:** Fall, Spring.

## **WQMS 202 Small Water Systems Operation and Maintenance3 Credits**

Introduction to the practical, hands-on aspects of the safe and effective operation and maintenance of small water system collection, treatment, and disposal. Topics include the safe operation and maintenance of small water treatment plants, lift stations, and other facilities.

## **WQMS 203 Water Quality Small Wastewater Systems3 Credits**

Introduction to the practical, hands-on aspects of the safe and effective operation and maintenance of small wastewater collection, treatment, and disposal systems. Topics include the safe operation and maintenance of small water treatment plants, lift stations and other facilities, and maintenance and rehabilitation of collection facilities for the small wastewater system operator.

## **WQMS 212 Drinking Water Regulations4 Credits**

Knowledge and skills to establish a compliance program for a water treatment facility using ground water, surface water, or ground water influenced by surface water sources. The student will learn all regulatory requirements for microbiological and chemical contamination (organic, inorganic, and radio) for monitoring and reporting operations.

**WQMS 216 Biological and Bacteriological Water Quality Analyses4**

**Credits**

Exploration of microorganisms associated with all phases and concerns of water and wastewater treatment including bacteria, protozoa, and algae. Topics include: microorganisms used in treatment, pathogenic indicators, regulations, health hazards and laboratory safety. Laboratory work involves media preparation, coliform testing, standard plate count, algae identification, activated sludge examination, volatile acids/alkalinity and biomonitoring.

**WQMS 224 Water Certification Review for Class A & B3 Credits**

Exploration of topics found on the state levels A and B certification exams. Topics include complex treatment techniques, administration and management, which include: recarbonation systems, lime and soda ash chemical softening, ion exchange, reverse osmosis systems, membrane filtration, corrosion control systems using sequestering agents, fluoridation techniques, and chemical taste and odor control techniques, as well as advanced operational mathematics.

**WQMS 225 Wastewater Certification Review for Class A & B3 Credits**

Exploration of topics found on the state levels A and B certification exams. Topics include complex treatment techniques, administration and management, which include: activated sludge processes, trickling filters, rotating biological contactors, digesters and Advanced Waste Treatment (AWT) systems. The student will learn advanced mathematical calculations to perform waste flow, solids volume percent concentrations, and Mean Cell Residence Times (MCRT).