

# Water Treatment & Transmission Technology

The Water Treatment and Transmission Technology Certificate Program includes 10 modules. All modules are self-paced, online courses. Students will receive a certificate upon completing each module as well as an overall certificate after completing all five modules. The topics of the ten modules are outlined below.

## Water Sources

### (2.1 CEUs)

- Water Supply Hydrology
- Groundwater Sources
- Surface Water Sources
- Emergency and Alternative Water Sources
- Use and Conservation of Water
- Water Quality
- Water Source Protection

## Introduction to Water Treatment

### (4.3 CEUs)

- Water Treatment Processes
- Treatment of Water at the Source
- Preliminary Treatment
- Water Coagulation and Flocculation
- Sedimentation Basins and Clarifiers
- Filtration
- Disinfection
- Fluoridation

## Advanced Water Treatment

### (4.3 CEUs)

- Control of Corrosion and Scaling
- Iron and Manganese Control
- Lime Softening
- Ion Exchange
- Adsorption
- Aeration
- Membrane Processes
- Water Treatment Plant Residuals
- Treatment Plant Instrumentation and Control

## Water Treatment Math

### (3.6 CEUs)

- Powers and Scientific Notation
- Dimensional Analysis
- Rounding and Estimating
- Solving for the Unknown Value
- Ratios and Proportions
- Averages
- Percentages
- Linear Measurements
- Area Measurements
- Volume Measurements

## Applied Chemistry

### (2.9 CEUs)

- Operator Chemistry Made Easy
- The Structure of Matter
- The Classification of Matter
- Valence, Chemical Formulas, and Chemical Equations
- Solutions
- Acids, Bases, and Salts
- Chemistry of Treatment Processes
- Chemical Dosage Problems

# Water Treatment & Transmission Technology

## Water Transmission and Distribution I (4.8 CEUs)

- Introduction to Water Distribution Systems
- Pipe Systems and Piping
- Water Storage
- Pumping Stations and Pumps
- Hydraulics of Water Distribution Systems
- Valves
- Fire Hydrants
- Motors and Engines
- Instrumentation and Control

## Water Transmission and Distribution II (4.9 CEUs)

- Water Meters
- Backflow Prevention and Cross-Connections Control
- Water Main Installation
- Backfilling, Main Testing, and Installation Safety
- System Operations
- Water Services
- Information Management
- System Security and Emergency Response
- Public Relations

## Water Quality (4.1 CEUs)

- Public Water Supply Regulations
- Water Quality Monitoring
- Laboratory Equipment and Instruments
- Microbiological Contaminants
- Physical and Aggregate Properties of Water
- Inorganic Chemicals
- Organic Contaminants
- Radiological Contaminants
- Customer Complaint Investigations

## Applied Hydraulics (2.0 CEUs)

- Density and Specific Gravity
- Pressure and Force
- Piezometric Surface and Hydraulic Grade Line
- Head
- Head Loss
- Pumping Problems
- Flow Rate Problems
- Thrust Control

## Electricity for the Water Industry (1.4 CEUs)

- Electricity, Magnetism, and Electrical Measurements
- Electrical Quantities and Terms
- Functions and Ratings of Electrical Equipment

# Water Sources

## **Course Overview**

This course is designed to introduce students to the sources of water and the various threats to our water supply. Course material consists of reading assignments, video lectures, and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Students are not permitted to “challenge” the course quizzes to receive credit. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor’s review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the Water Sources course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: Water Treatment Operator Training Handbook  
Edition: Third Edition  
Author: Nicholas Pizzi and William C. Lauer  
ISBN: 978-1-58321-861-7

## **Educational Objectives**

- To provide students with an overview of water use and conservation
- To provide students with a foundational knowledge of water sources
- To acquaint students with various source water threats
- To provide students with an overview of source water protection
- To provide students with an overview of water quality, water quality regulations and the public health concerns regarding water quality

# Introduction to Water Treatment

## **Course Overview**

This course is designed to provide a foundational look at Water Treatment processes and methods. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for 4.3 CEUs (43 contact hours) for the *Introduction to Water Treatment* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: Water Treatment Operator Training Handbook

Edition: Third Edition

Author: Nicholas Pizzi and William C. Lauer

ISBN: 978-1-58321-861-7

## **Educational Objectives**

- To provide students with an overview of water treatment processes
- To provide students with a foundational knowledge of treatment processes at different stages of water treatment
- To acquaint students with the different components of a water treatment plant and their function

# Advanced Water Treatment

## **Course Overview**

This course is designed to provide an advanced overview of Water Treatment processes and methods. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for 4.3 CEUs (43 contact hours) for the *Advanced Water Treatment* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: Water Treatment Operator Training Handbook  
Edition: Third Edition  
Author: Nicholas Pizzi and William C. Lauer  
ISBN: 978-1-58321-861-7

## **Educational Objectives**

- To provide students with an overview of water treatment processes
- To provide students with an advanced understanding of treatment processes at different stages of water treatment
- To acquaint students with the different components of a water treatment plant and their function

# Water Treatment Math

## **Course Overview**

This course is designed to acquaint students with the math, formulas and calculations used in water treatment, storage and distribution. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for 3.6 CEUs (36 contact hours) for the Water Treatment Math course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: *Basic Science Concepts and Applications, Principles and Practices of Water Supply Operations* series

Edition: Fourth Edition

Author: Nicholas G. Pizzi

ISBN: 1-58321-778-9

## **Educational Objectives**

- To provide a foundational understanding of powers and scientific notation
- To demonstrate dimensional analysis
- To provide students with an understanding of rounding, estimating, and solving for an unknown value
- To demonstrate ratios, proportions, averages and percentages
- To provide students with an understand of linear measurements
- To provide a foundational understanding of area and volume measurement calculations
- To demonstrate conversions

# Water Treatment Math

- To demonstrate graphs and tables and their uses in water treatment
- To provide students with a foundational understanding of calculating per capita water use, domestic water use, and industrial water use
- To demonstrate calculating average daily flow, surface overflow and weir overflow rates
- To provide a foundational understanding of filter loading and filter backwash rates
- To demonstrate mudball calculation
- To demonstrate detention time calculations
- To demonstrate well problem calculations

# Applied Chemistry

## **Course Overview**

This course is designed to acquaint students with the chemistry principles involved in water treatment, storage and distribution, and the math that applies to chemistry principles. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the *Applied Chemistry* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: *Basic Science Concepts and Applications, Principles and Practices of Water Supply Operations* series

Edition: Fourth Edition

Author: Nicholas G. Pizzi

ISBN: 1-58321-778-9

## **Educational Objectives**

- To provide students with an overview of the structure of matter
- To provide students with an overview of the classification of matter
- To acquaint students with chemical formulas and equations
- To provide students with an overview of solutions, calculating solutions and dilution calculations
- To acquaint students with acids, bases and salts
- To provide students with an overview of the chemistry of water treatment processes
- To acquaint students with chemical dosage problems and calculations



# Water Transmission and Distribution I

## **Course Overview**

This course is designed to provide a foundational understanding of Water Transmission and Distribution, system maintenance and inspection, and the safety of the public water supply. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for 4.8 CEUs (48 contact hours) the *Water Transmission and Distribution I* course, which is applicable toward a Certificate in Water Transmission Technology from American Water College.

## **Required Texts**

Textbook: Water Distribution Operator Training Handbook

Edition: Fourth Edition

Authors: William C. Lauer

ISBN: 978-1-58321-954-6

Textbook: Water Treatment Operator Training Handbook

Edition: Third Edition

Authors: Nicholas Pizzi and William C. Lauer

ISBN: 978-1-58321-861-7

## **Educational Objectives**

- To provide students with an overview of system design, operation and maintenance
- To provide students with a foundational knowledge of types of equipment used to transmit and distribute water
- To acquaint students with the principles of water storage and safety
- To provide students with a foundational knowledge of pumps, pumping stations, operation, safety, record keeping and maintenance
- To acquaint students with valves and hydrants, their inspection, installation and maintenance

# Water Transmission and Distribution I

- To provide a foundational overview of motors and engines used in water transmission and distribution
- To acquaint students with the instrumentation and control of a water distribution system

# Water Transmission and Distribution II

## **Course Overview**

This course is designed to provide an advanced understanding of Water Transmission and Distribution, system maintenance and inspection, and the safety of the public water supply. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for 4.9 CEUs (49 contact hours) for the *Water Transmission and Distribution II* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: Water Distribution Operator Training Handbook

Edition: Fourth Edition

Authors: William C. Lauer

ISBN: 978-1-58321-954-6

Textbook: Water Treatment Operator Training Handbook

Edition: Third Edition

Authors: Nicholas Pizzi and William C. Lauer

ISBN: 978-1-58321-861-7

## **Educational Objectives**

- To acquaint students with water metering, meter testing, maintenance and repair, and meter reading
- To provide students with a foundational knowledge of backflow prevention and the reasons for cross-connection control
- To acquaint students with water mains, installation and safety
- To provide students with a foundational knowledge information management and record-keeping responsibilities
- To acquaint students with threats to the public water supply, vulnerabilities in the public water supply, and emergency response plans

# Water Quality

## **Course Overview**

This course is designed to provide an overview of water quality regulations, methods of compliance, instrumentation used to monitor and ensure water quality, and the analysis required to supply clean and safe drinking water to the public. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the Water Quality course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: Water Distribution Operator Training Handbook

Edition: Fourth Edition

Authors: William C. Lauer

ISBN: 978-1-58321-954-6

Textbook: Water Treatment Operator Training Handbook

Edition: Third Edition

Authors: Nicholas Pizzi and William C. Lauer

ISBN: 978-1-58321-861-7

## **Educational Objectives**

- To provide an overview of state and federal water quality regulations
- To acquaint students with the instrumentation utilized in maintaining water quality
- To acquaint students with tests and methods of compliance
- To provide an overview of analysis and data monitoring
- To demonstrate the public's reliance on operators to provide clean and safe drinking water

# Applied Hydraulics

## **Course Overview**

This course is designed to acquaint students with the hydraulics involved in water treatment, storage and distribution, and the math that applies to hydraulic principles. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the *Applied Hydraulics* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: *Basic Science Concepts and Applications, Principles and Practices of Water Supply Operations* series

Edition: Fourth Edition

Author: Nicholas G. Pizzi

ISBN: 1-58321-778-9

## **Educational Objectives**

- To provide students with an overview of density and specific gravity and the mathematical concepts that apply
- To provide students with an overview of pressure and force, and the mathematical concepts that apply
- To acquaint students with the principles of piezometric surface and hydraulic grade lines
- To acquaint students with head, head loss, and the mathematical applications that apply
- To acquaint students with pumps and calculating their efficiency
- To acquaint students with flow rate problems encountered in the water treatment and distribution process
- To acquaint students with thrust, thrust control, and the mathematical concepts that apply

# Electricity for the Water Industry

## **Course Overview**

This course is designed to acquaint students with the electric terms, measurements and equipment used in water treatment, storage and distribution. Course material consists of reading assignments, video lectures, review questions, study problems and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the *Electricity for the Water Industry* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

## **Required Texts**

Textbook: *Basic Science Concepts and Applications, Principles and Practices of Water Supply Operations* series

Edition: Fourth Edition

Author: Nicholas G. Pizzi

ISBN: 1-58321-778-9

## **Educational Objectives**

- To provide students with an overview of electricity, magnetism and electrical measurements used in the water industry
- To provide students with the proper electrical quantities and terms used in the water industry
- To demonstrate the functions and the applicable ratings of electrical equipment used in the water industry