



## **Distribution Exam Preparation Grade 4 Course Syllabus**

### **Purpose**

This course is designed to prepare you for your supervisor level distribution system operator exam.

### **Topics**

#### Basic Water Math

Unit Conversions  
Working with Formulas  
Understanding Percentages  
Calculating Area  
Calculating Volume  
Weight Volume Relationships  
Force-Pressure-Head  
Velocity and Flow Rate  
Pumps  
The Metric System  
Problem Solving

#### Math and Distribution System Review

Flow Conversion Problems  
System Design and Layout  
Volume Problems  
Flow Rate Problems  
Distribution Piping  
Water Storage  
Fire Hydrants and Valves  
Water Meters  
Pumps and Motors  
Cross-Connection Control  
Disinfection  
Distribution Disinfection Problems  
Chemical Feed Problems  
Corrosion Control  
Water Quality  
Distribution Laboratory Problems  
Water Main Installation and Backfilling  
Safety  
Regulations  
Instrumentation and Information Technology  
Hydraulics

### **CEUs (Contact Hours)**

Upon completion of this course, you will receive a certificate for 4.6 CEUs (46 contact hours).

### **Completion Requirements**

In order to receive [IACET CEU](#) credit for this course, you must complete the following:

- Complete each individual lesson module by watching the video lecture, completing the lesson handout, and passing the lesson quiz.

Once you have completed all of these elements, your course completion certificate will be automatically placed into your learning account for printing/downloading. It will remain in your learning account even after your course access has expired.

## **Learning Objectives**

### Unit Conversions

Upon completion of this lesson the student will be able to:

- Define what a unit is
- Define what an equivalent is
- Demonstrate how units and equivalents are used to solve math problems

### Working with Formulas

Upon completion of this lesson the student will be able to:

- Define what a formula is
- Demonstrate how a formula is used
- Demonstrate how formulas are rearranged
- Demonstrate how to solve math problems using formulas

### Understanding Percentages

Upon completion of this lesson the student will be able to:

- Demonstrate how to convert between fractions and percentages
- Demonstrate how to convert between decimals and percentages

### Calculating Area

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve for the area of a square
- Demonstrate how to solve for the area of a rectangle
- Demonstrate how to solve for the area of a circle
- Demonstrate how to solve for the area of a triangle

### Calculating Volume

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve for the volume of a cube
- Demonstrate how to solve for the volume of a cylinder
- Demonstrate how to solve for the volume of a cone
- Demonstrate how to solve for the volume of a sphere

### Weight/Volume Relationships

Upon completion of this lesson the student will be able to:

- Recall how many pounds one gallon of water weighs
- Recall how many gallons are in one cubic foot
- Recall how many pounds one cubic foot of water weighs
- Recall how many liters are in one gallon
- Recall how many pounds are in one kilogram
- Discuss and demonstrate how these weight and volume relationships are used to solve math problems

### Force-Pressure-Head

Upon completion of this lesson the student will be able to:

- Define force
- Define pressure

- Define water head
- Recall how many psi (pounds per square inch) is one foot of water head
- Discuss and demonstrate how to solve math problems involving force-pressure-head calculations
- Demonstrate how to calculate feet of water head
- Demonstrate how to calculate pressure due to head
- Demonstrate how to calculate force on a tank due to head

#### Velocity and Flow Rate

Upon completion of this lesson the student will be able to:

- Define velocity
- Demonstrate how velocity is calculated
- Define flow rate
- Demonstrate how flow rate is calculated

#### Pumps

Upon completion of this lesson the student will be able to:

- Define horsepower
- Define water horsepower
- Define break horsepower
- Define motor horsepower
- Discuss and demonstrate how to solve pump math problems involving horsepower

#### The Metric System

Upon completion of this lesson the student will be able to:

- Define what metric system units
- Demonstrate how to convert between weight and volume measurements in the metric system
- Demonstrate how to convert between metric units and standard units

#### Problem Solving

Upon completion of this lesson the student will be able to:

- Define the five steps to problem solving
- Determine if all five steps are needed to solve a specific problem
- Explain how the five steps work
- Apply the five step problem solving method to water math problems

#### Flow Conversion Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to convert between MGD and gpm
- Demonstrate how to convert between MGD and CFS

#### System Design and Layout

Upon completion of this lesson the student will be able to:

- Define system design and layout vocabulary
- Identify what makes a water system “public”
- Identify the different types of public water systems
- Describe distribution system design considerations

- Describe different system layout designs

#### Flow Rate Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve math problems relating flow rate through a pipe
- Demonstrate how to solve math problems relating flow into a storage tank

#### Volume Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve trench volume problems
- Demonstrate how to solve tank volume problems

#### Distribution Piping

Upon completion of this lesson the student will be able to:

- Define piping vocabulary
- Identify the four main pipe selection considerations
- Describe the construction material and construction characteristics of common pipe
- Describe different pipe joints and their applications

#### Water Storage

Upon completion of this lesson the student will be able to:

- Define water storage vocabulary
- Identify the purpose of water storage
- Describe the differences between various types of storage facilities
- Describe how storage facilities are constructed

#### Fire Hydrants and Valves

Upon completion of this lesson the student will be able to:

- Define hydrants and valves vocabulary
- Identify the four main types of hydrants
- Describe gate valve construction and use
- Describe globe valve construction and uses
- Describe ball valve construction and use
- Describe butterfly valve construction and uses
- Describe relief valve construction and uses
- Describe pressure regulating valve construction and uses
- Describe air and vacuum relief valve construction and uses
- Describe altitude valve construction and uses

#### Water Meters

Upon completion of this lesson the student will be able to:

- Define water meters vocabulary
- Describe the construction and operation of the different types of water meters
- Describe the normal application of the various water meters

### Pumps and Motors

Upon completion of this lesson the student will be able to:

- Define pumps and motors vocabulary
- Describe the construction and operation of velocity type pumps
- Describe the functions of the main components of a centrifugal pump
- Describe the theory of operation and common uses of positive displacement pumps
- Describe the differences between the various types of single and three-phase motors

### Cross-Connection Control

Upon completion of this lesson the student will be able to:

- Define cross-connection control vocabulary
- Describe the purpose of cross-connection control
- Describe potential cross-connections
- Describe backflow control devices

### Disinfection

Upon completion of this lesson the student will be able to:

- Define distribution disinfection vocabulary
- Describe the different characteristics of disinfecting agents
- Identify the different disinfection methods for water mains
- Identify different disinfection methods for water storage facilities

### Distribution Disinfection Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve math problems relating to mixing chlorine solutions
- Demonstrate how to solve math problems relating to chlorine dosing
- Demonstrate how to solve math problems relating to chlorine demand

### Chemical Feed Problems

Upon completion of this lesson the student will be able to:

- Calculate Chemical Feed rates
- Solve Chemical Feed Problems

### Corrosion Control

Upon completion of this lesson the student will be able to:

- Define corrosion control vocabulary
- Recall the factors affecting corrosion
- Describe the tools used to control corrosion
- Identify the LCR (Lead and Copper Rule) requirements

### Water Quality

Upon completion of this lesson the student will be able to:

- Define water quality vocabulary
- Identify types of samples collected
- Identify sample custody requirements
- Describe which water quality parameters are monitored
- Describe what different water quality parameters indicate

- Describe the different public notification requirements

#### Distribution Laboratory Problems

Upon completion of this lesson the student will be able to:

- Demonstrate how to solve math problems relating to running averages
- Demonstrate how to solve math problems relating to meter accuracy

#### Water Main Installation and Backfilling

Upon completion of this lesson the student will be able to:

- Define water main installation vocabulary
- Define backfilling vocabulary

#### Safety

Upon completion of this lesson the student will be able to:

- Define safety vocabulary
- Describe trenching safety requirements
- Describe confined space safety requirements
- Describe how to set up a traffic diversion

#### Regulations

Upon completion of this lesson the student will be able to:

- Define regulation vocabulary
- Describe and identify each of the following rules/regulations
- Safe Drinking Water Act (SDWA)
- Surface Water Treatment Rule (SWTR)
- Total Coliform Rule (TCR)
- Lead and Copper Rule (LCR)
- Stage 1 Disinfection by Product Rule (DBP)
- Interim Enhanced Surface Water Treatment Rule (IESWTR)
- Long Term 2 Surface Water Treatment Rule (LT2SWTR)
- Stage 2 Disinfection by Products Rule (DBP)

#### Instrumentation and Information and Technology

Upon completion of this lesson the student will be able to:

- Define Instrumentation and Information and Technology vocabulary
- Identify Primary and Secondary Instrumentation and Telemetry
- Define and classify Equipment Control Systems
- Define SCADA
- Define System Mapping and identify different types of system maps and symbols

#### Hydraulics

Upon completion of this lesson the student will be able to:

- Define Hydraulics vocabulary
- Perform calculations using force, pressure, and head

**Support**

Students can contact our student support staff with any course-related, content-related, or technology-related inquiries.

Our office hours are Monday-Thursday, 9-5 CT, and Friday 9-12 CT.

**Contact Info**

Phone Number: (661) 874-1655

General Course Inquiries: [Info@americanwatercollege.org](mailto:Info@americanwatercollege.org)