**703B WATER DISTRIBUTION SYSTEM: DISTRIBUTION FACILITIES**
**Office of Water Programs**
**California State University, Sacramento**
(1.8 Continuing Education Units)

## COURSE DESCRIPTION

This course teaches operators how to identify different types of storage facilities, pipes, joints, meters, and backflow prevention devices. Operators learn how to identify suitable locations for facilities, inspect storage facilities, and take a storage facility out of service and return it to service. Discussions include storage facilities O&M and selecting and applying protective coatings. Operators learn about collecting samples from a storage facility, protecting equipment from corrosion, and maintaining records. Also discussed are the purpose of a water distribution system, distribution system storage, and pumping facilities; and the importance of hydraulics. Operators learn about safe and proper ways to install pipe and backflow protection devices. Surge control in pipelines carrying liquids is also discussed.

## COURSE OUTLINE
**703B –Water Distribution System: Facilities**

The course uses Chapters 2 and 3 and selected appendix sections from OWP's *Water Distribution System Operation and Maintenance* course book.

## Chapter 2 – Water Storage Facilities

Following completion of chapter 2, students should be able to:

1. Identify types, determine suitable locations, and inspect storage facilities.
2. Take a storage facility out of service and put it back on line.
3. Safely operate and maintain a storage facility, including selecting and applying protective coatings.
4. Collect samples from a storage facility.
5. Troubleshoot storage facility problems.
6. Protect a storage facility from corrosion.
7. Disinfect a storage facility.
8. Maintain records for a storage facility.

## Chapter 3 - Distribution System Facilities

Following completion of Chapter 3, students should be able to:

1. Explain the effect of hydraulics on the performance of a distribution system.
2. Describe the function of distribution storage facilities and pumping facilities.
3. Identify and install various types of pipes and joints.
4. Identify and test various types of meters.
5. Determine the need for and install various types of backflow prevention devices

**TIME ASSIGNMENT:**

**Text Pages**: The course uses Chapters 2 and 3 and selected appendix sections from *Water Distribution System Operation and Maintenance* (160 pages).  The average word count on a page from the training manual is 950 words.  Some pages contain tables, graphs, or illustrations to enhance the presentation of information.  It is assumed that readers spend equal time studying tables, graphs, and illustrations as they would spend reading the equivalent amount of text.  Therefore, each page is assumed to contain the equivalent of 950 words.  Accepted average adult reading speed is 200 – 250 words per minute.  Therefore, each page requires four minutes of student time for each reading.

**Web screens (local)**: The course web pages function as the "instructor" for the course.  The pages contain topic introduction and description material and they provide instructions for reading assignments, links to supporting web pages, interactive student exercises, video clips, quizzes, glossaries, and the final exam.  In this analysis, local web pages are distinguished from supporting (or linked) web pages for accounting purposes only.  Students will utilize local and linked web pages seamlessly as they progress through the course.

Local web screens consist of the home page (1), course instruction and help pages (8), content pages (37), student tools pages (5), glossary pages (25), quiz pages (2), and final exam page (1).

**Web screens (linked)**: Linked web resources are an integral part of the course and students are expected to utilize these linked resources extensively as part of their training.  Examples of linked resources are the websites for the U. S. EPA Public Drinking Water Systems Programs, the Groundwater Foundation, and the Nebraska Health and Human Services System.  Each of these sites contains many internal and external links that lead to a plethora of resource information.  To be conservative in the count of linked web screens, only the web pages directly linked from the course content pages and the first level linked pages from those directly linked pages will be counted.  Subsequent linked pages will not be counted although it is expected that many students will explore and study the information contained on those subsequent links.  The projected average amount of time spent per web page is one minute.  The total number of linked pages in the course is 131.

**Interactive exercises**: The interactive math exercises in this course generate a new problem every time they are opened.  Therefore, each interactive math exercise can present an unlimited number of unique problems.  For conservative quantification purposes, it will be assumed that each interactive math exercise will be called three times each during a course.  The non-math interactive exercises are projected to be accessed once per course.  Each interactive exercise is projected to take two minutes time.  There are 17 interactive exercises in the course.  Seven (7) of those interactive exercises are math type, which, if called upon to generate three unique problems each, create 21 interactive exercises.  The total number of interactive exercises is 31.

**Math problems**: The course contains 31 water distribution math problems. Projected average time to solve each math problem is three minutes.

**Review questions**: The course contains 137 interactive review questions.  Each review question requires a written response consisting one or more sentences.  Projected average review question time is two minutes per question.

**Discussion questions**: The course contains 37 discussion questions.  Each discussion question requires a written response consisting one or more sentences.  Projected average discussion question time is two minutes per question.

**Objective test questions**: The course contains 107 objective test questions.  Projected average question time is one minute per question.

**Video**: The course contains 54 minutes of video.  Projected viewings: one.

**Final exam**: The final exam consists of 82 questions.  Projected average exam question time is one minute per question.

| Component | Minutes per Component Unit | Number of Component Units | Time to Complete Units |
|---|---|---|---|
| Text pages | 4 | 160 | 640 |
| Web screens (local) | 1 | 79 | 79 |
| Web screens (linked) | 1 | 131 | 131 |
| Interactive exercises | 2 | 31 | 62 |
| Math problems | 3 | 31 | 93 |
| Review questions | 2 | 137 | 274 |
| Discussion questions | 2 | 37 | 74 |
| Objective test questions | 1 | 107 | 107 |
| Video (minutes) | 1 | 26 | 26 |
| Exam questions | 1 | 82 | 82 |
| | | | |
| **Total (minutes)** | | | **1,568** |
| **Total (hours)** | | | **26.1** |