

**702A SMALL WATER SYSTEMS: WELLS**  
**Office of Water Programs**  
**California State University, Sacramento**  
(1.8 Continuing Education Units)

**Course Description**

Upon completion of this course, operators should be able to set up a wellhead protection program, identify parts of a well and pump system, maintain and rehabilitate a well, operate and maintain a well pump and hydro pneumatic pressure tank, inspect a well and pumping system, disinfect wells and pumps, keep accurate records of a well and pumping system, remove sand from water mains, troubleshoot problems in wells and pumping systems, select a well site, describe types of wells and drilling methods, test and evaluate a well and pump, and abandon and plug a well no longer productive or needed. 1.8 CEUs (18 contact hours).

**Course Topic Outline**

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|--------------------------------------|-------------------------------------------|
| Groundwater – Critical Link to Wells | Electrical Supply and Controls            |
| Well Site Selection                  | Troubleshooting                           |
| Structure and Components             | Abandoning and Plugging Wells             |
| Testing and Evaluation               | Operator Responsibility and Recordkeeping |
| Maintenance and Rehabilitation       | Math Assignment                           |
| Well Pumps and Service Guidelines    | Additional Resources                      |
| Disinfection of Wells and Pumps      |                                           |

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**Average word count:** 520 words per screen

**Average reading speed:** 130 words per minute; 4 minutes per screen

The course is based on Chapter 2, “Wells” and other sections from the related training manual. The course contains text, tables, graphs, illustrations, math example problems, and chapter review questions to enhance the presentation of information and the student learning experience. The course is designed for students to spend the same amount of time reading the tables, graphs, and illustrations as they spend reading the equivalent amount of related course text presented on screen.

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**Number of Moodle screens (internal):** The course contains 33 Moodle learning management system screens.

Moodle screens consist of 1 home screen, 1 course instruction and help screen, 13 content screens, 6 glossary screens, 11 quiz screens, and 1 final exam screen.

**Average reading speed:** 1 minute per screen

The Moodle screens function as the “instructor” for the course, providing topic introduction, reading assignments, links to external web page resources, interactive student exercises, video clips, quizzes, a glossary and final exam. In this time assignment analysis, Moodle screens are distinguished from web page resource links for quantification purposes only. Students utilize internal Moodle screens and external web pages resource links seamlessly as they progress through the course.

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**Number of web page resource links (external):** The course contains 56 web page resource links that students use extensively as an integral part of their training course. Examples of websites include the US EPA Public Drinking Water Systems Programs, the Groundwater Foundation, and the Nebraska Health and Human Services System. Each site contains a large number of internal and external web links that provide additional resources for students

**Average reading time per web page resource link:** 1 minute per link

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**Number of Interactive exercises:** The course contains a total of 47 interactive exercises, including 26 general course content interactive exercises and 7 interactive math exercises. Each interactive math exercise can present an unlimited number of unique problems so students can attempt each exercise multiple times. For the purpose of this time assignment, it is assumed that students will attempt each of the 7 interactive math exercises three times, counting as 21 math exercises.

**Average interactive exercise answer speed:** 2 minutes per interactive exercise

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**Number of math example exercises:** The course contains 6 small water system in-text math example exercises that support and expand the concepts presented in the online course text.

**Average math example exercise answer speed:** 3 minutes per math exercise

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**Number of chapter review questions:** The course contains 45 review questions in the “Check your understanding” section at the end of each topic. Question types include fill-in and multiple choice.

**Average chapter review question/answer speed:** 2 minutes per question

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**Number of minutes of video:** The course contains 54 minutes of video. Students are projected to watch one viewing.

**Average video viewing time:** 54 minutes

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**Final exam:** The course contains 82 final exam questions. Question types include true/false; best answer (one correct answer); multiple choice (one or more correct answers); and math (requiring students to work through equations to find solutions).

**Average final exam question/answer speed:** 2 minutes per final exam question

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The table summarizes the course components outlined above and shows the calculations for the total time assignment values in minutes and hours.

### Time Assignment

| Course component         | Number of component units | Minutes required to complete component unit | Total time assignment for component |
|--------------------------|---------------------------|---------------------------------------------|-------------------------------------|
| Text pages               | 154 ×                     | 4 =                                         | 616                                 |
| Web screens (internal)   | 33 ×                      | 1 =                                         | 33                                  |
| Web screens (external)   | 56 ×                      | 1 =                                         | 56                                  |
| Interactive exercises    | 47 ×                      | 2 =                                         | 94                                  |
| Math example exercises   | 6 ×                       | 3 =                                         | 18                                  |
| Chapter review questions | 45 ×                      | 2 =                                         | 90                                  |
| Videos (minutes)         | 54 ×                      | 1 =                                         | 54                                  |
| Final exam questions     | 82 ×                      | 2 =                                         | 164                                 |
|                          |                           |                                             | <b>1,125 minutes</b>                |
|                          |                           |                                             | <b>18.8 hours</b>                   |