

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

CENTER FOR WATER STUDIES 210 – ADVANCED LABORATORY ANALYSIS FOR WATER & WASTEWATER

3 hours lecture, 3 units

Catalog Description

Examines the fundamentals of laboratory analysis with an emphasis on applied chemical and microbiological procedures for water and wastewater plant operators. Includes procedures and techniques used in physical, chemical, bacteriological and biological examination of water/wastewater. Covers State Department of Public Health and Federal EPA, Clean Water and Safe Drinking Water Act regulations related to the operation of a water or wastewater laboratory. Completion of CWS 110 and CWS 210 provides the foundation knowledge and skills necessary to test for the California Water Environment Association (CWEA) Grade 1 Laboratory Analyst Certificate.

Prerequisite

“C” grade or higher or “Pass” in CWS 110 or equivalent course

Entrance Skills

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Identify laboratory equipment necessary for elementary analysis of water/wastewater.
- 2) Demonstrate working knowledge of pertinent terminology for the chemical, physical, and bacterial characteristics of ground water and surface water supplies.
- 3) Perform basic calculations associated with a water/wastewater laboratory.
- 4) Perform basic physical and analytical techniques common in a water/wastewater laboratory.
- 5) Collect representative samples
- 6) Safely perform sampling and analysis functions following appropriate laboratory safety procedures

Course Content

- 1) Introduction: scope, course objectives
- 2) Laboratory safety including proper procedures for chemical and biological waste storage and disposal
- 3) Identification and use of laboratory equipment commonly used in water and wastewater analysis
- 4) Use and identification of microbiological and chemical terminology
- 5) Data Validation and Analysis Quality Control
- 6) Documentation including Chain of Custody, Analysis Worksheets, Sample documents, EPA documentation protocols and Standard Operating Procedures
- 7) Discussion and identification of Environmental Protection Administration approved methods
- 8) Sample container and glassware preparation
- 9) Microbiological analysis using sterile techniques – Multiple Tube Fermentation (WTF) methods, Heterotrophic Plate Count
- 10) Typical analysis to be performed: BOD, Dissolved Oxygen using selective Ion probe and, turbidity, settleable solids.
- 11) Collect samples utilizing proper sampling protocol
- 12) California Code of Regulations Title 8 & Title 22 Domestic Water Quality and Monitoring Regulations

Course Objectives

Students will be able to:

- 1) Properly collect samples from a variety of water and wastewater sources.
- 2) Select and set up appropriate field and laboratory instrumentation necessary to perform analytical tests in accordance with water and wastewater industry standard practices.
- 3) Perform advanced physical, chemical, and microbiological and analyses in accordance with techniques common in a water/wastewater laboratory such as alkalinity, pH, hardness, temperature, turbidity, dissolved oxygen, biological oxygen demand, chlorine residual, etc.
- 4) Describe the role the laboratory plays in protecting the public drinking water supply and in monitoring treatment plant processes.
- 5) Explain the role data management, validation and analysis plays in operating a water or wastewater laboratory.
- 6) Demonstrate knowledge of laboratory safety hazards and proper precautions, procedures, chemical and biological hygiene including the use of appropriate personal protective equipment.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Laboratory Analysis
- 2) Writing assignments
- 3) Quizzes
- 4) Exams (objective, essay)

Special Materials Required of Student

None

Minimum Instructional Facilities

Smart classroom, laboratory facility

Method of Instruction

- 1) Lecture and discussion
- 2) Audiovisual
- 3) Field trips

Out-of-Class Assignments

- 1) Reading assignments
- 2) Writing assignments
- 3) Project assignments

Texts and References

- 1) Required (representative example): Pizzi, Nicholas. *Basic Science Concepts and Applications*. 4th edition. American Water Works Association, 2010.
- 2) Supplemental:
 - a. California Water Environment Association - Laboratory Analyst Certification - Candidate Handbook
 - b. California Code of Regulations Title 8 & Title 22 Domestic Water Quality and Monitoring Regulations

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Identify and properly set up equipment used in the analysis of water/wastewater quality.
- 2) Perform calculations commonly associated with a water/wastewater laboratory.

- 3) Demonstrate competence of the physical and analytical techniques commonly used in a water/wastewater laboratory.
- 4) Demonstrate knowledge of Analysis Quality Control techniques.
- 5) Properly document analytical results using EPA protocols.