

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

CENTER FOR WATER STUDIES 110 – LABORATORY ANALYSIS FOR WATER & WASTEWATER

3 hours lecture, 3 units

Catalog Description

Examines basic 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. Completion of CWS 110 and CWS 210 provides the foundation necessary to obtain a CWEA Grade 1 Laboratory Analyst Certificate.

Prerequisite

None

Course Content

- 1) Introduction: scope, course objectives
- 2) Structure of matter, compounds, formulas
- 3) Basic laboratory safety
- 4) Identification and use of basic laboratory equipment
- 5) Use and identification of Microbiological and Chemical terminology
- 6) Data Validation and Analysis Quality Control
- 7) Documentation including Chain of Custody, Analysis Worksheets, Sample documents, EPA documentation protocols and Standard Operating Procedures
- 8) Discussion and identification of EPA approved methods and when EPA approved methods are required
- 9) Sample container and glassware preparation
- 10) Discussion on microbiological organisms, including bacteria, viruses, and protozoa
- 11) Microbiological analysis – Coliforms using MUG method
- 12) Chlorine forms, disinfection, analysis, and chloramination chemistry
- 13) Perform titrations to determine Total Hardness and Total Alkalinity
- 14) Perform physical analysis to determine Total Solids, Suspended Solids, Dissolved Solids, pH and temperature
- 15) Perform colorimetric analysis using a spectrometer including Beer's Law and linearity

Course Objectives

Students will be able to:

- 1) Comprehend the types and uses of equipment necessary for elementary analysis of water/wastewater.
- 2) Properly identify and use appropriate chemical and microbiological terminology.
- 3) Perform basic calculations associated with a water/wastewater laboratory.
- 4) Understand basic physical and analytical techniques common in a water/wastewater laboratory.
- 5) Determine data validity using Analysis Quality Control protocols.
- 6) Collect representative samples.

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, skill demonstration or, where appropriate, the symbol system.

- 1) Laboratory analysis
- 2) Writing assignments
- 3) Exams & quizzes
- 4) Projects and assignments utilizing the Field Operations Skills Yard

Special Materials Required of Student

None

Minimum Instructional Facilities

Smart classroom, laboratory facility

Method of Instruction

- 1) Lecture and discussion
- 2) Laboratory Activities
- 3) Audiovisual
- 4) Demonstrations utilizing the Field Operations Skills Yard

Out-of-Class Assignments

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

Texts and References

- 1) Required (representative examples):
 - a. Pizzi, Nicholas. *Basic Science Concepts and Applications*. 4th edition. American Waterworks Association, 2010.
 - b. Manual of Water Supply Practices—M12, Sixth Edition, **Simplified Procedures for Water Examination**, Copyright © 2014 American Water Works Association, ISBN 978-1-58321-997-3
- 2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Identify equipment necessary for elementary analysis of water/wastewater.
- 2) Define in writing 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) Safely perform sampling and analysis functions following appropriate laboratory safety procedures.
- 6) Collect representative samples.

Student Learning Outcomes

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

- 1) Identify and utilize commonly used laboratory equipment for the analysis of water and wastewater quality.
- 2) Define in writing pertinent terminology used for the chemical, physical, and bacterial characteristics of ground water and surface water supplies.
- 3) Perform basic physical and analytical procedures commonly used in water and wastewater laboratory analysis.

- 4) Demonstrate proficiency in applying Analysis Quality Control techniques when performing laboratory exercises.