

City College of San Francisco
 Course Outline of Record
 Course Status: Active

I. GENERAL DESCRIPTION

A. Approval Date	April 2014
B. Effective Semester	No Semester Provided
C. Department	Engineering & Technology
D. Course Number	EMSA 22
E. Course Title	Foundations in Environmental Instrumentation, Sampling and Monitoring
F. Course Outline Originator	System Loaded
G. Department Chairperson	Hitesh Soneji
H. Dean	David Yee

II. COURSE SPECIFICS

A. Hours	Lecture: 52.50 total Lab: 52.50 total
B. Units	4.00
C. Prerequisite	None
Corequisite	None
Pre/Corequisite	None
Advisory	MATH 40 or ET 108A or BTEC 108A or placement in MATH 60; BIO 11; CHEM 32 or CHEM 40
Advisory Pre/Corequisite	None
D. Course Justification	This course introduces environmental monitoring with hands on skills in handheld field instruments, sampling and chain of custody. This is a foundational course for the Environmental Monitoring, Sampling and Assessment Program.
E. Field Trips	Yes
F. Method of Grading	Letter or Pass/No Pass
G. Repeatability	Course is not repeatable

III. CATALOG DESCRIPTION

This introductory course in environmental field monitoring provides exposure and understanding of environmental field sampling and monitoring techniques for chemical and microbiological contaminants that impact the environment. Theoretical and practical experience is offered with emphasis on regulatory requirements governing sampling and field analysis of water, soil and air matrices.

IV. STUDENT LEARNING OUTCOMES

Upon completion of this course, a student will be able to:

- Explain the general principles of environmental monitoring
- Describe the basic aspects of sampling air, water and soil for inorganic and organic chemicals as well as microbiological contaminants
- Demonstrate familiarity with rules and regulations associated with environmental sampling
- Explain the practical aspects of on-site chemical analysis
- Compare and contrast a variety of field and laboratory techniques used in the evaluation of environmental impact
- Perform basic microbiological techniques as they pertain to water quality monitoring, including use of aseptic techniques
- Calibrate, trouble shoot, and perform basic maintenance on commonly used field instruments and equipment
- Demonstrate the importance of proper sample labeling, preservation and chain of custody documentation for reliable, traceable and defensible data.
- Critically observe and analyze experimental results, and be able to compare data for regulatory limits

V. CONTENTS

- Introduction to Compliance Monitoring
 - The need for monitoring the environment

2. National Regulations established by the US. Congress such as Clean Water Act, Clean Air Act, Occupational Safety and Health Act, and Resource Conservation and Recovery ACT (RCRA) concerning hazardous waste/soil
 3. Key Federal and State Environmental Enforcement Agencies (Environmental Protection Agency- EPA, Occupational Safety and Health Administration- OSHA, Department of Toxic Substance Control Unit-DTSC)
 4. Microbiological and/or chemical contaminants currently regulated in water (surface water, drinking water and wastewater) including examination of the Contaminate Candidate List (CCL) that may be subject to future regulation
 5. Chemical Contaminants Threshold (CCT) limits for hazardous soil vs. non-hazardous soil
 6. Airborne contaminant level regulated under OSHA for Occupational Exposure and Ambient Air Quality Limits regulated by EPA
 7. Compliance, reporting procedures required by regulatory agencies
- B. Field Mobilization
1. Site selection
 2. Field trip preparation
 3. Field safety and personal protective equipment
 4. Sample containers
 5. Proper use and care of equipment, including equipment cleaning
- C. Sampling Strategies
1. General issues
 2. Importance of sampling and analysis plan
 3. Field monitoring techniques for soil & water quality (with lab)
 - a. Analytical applications
 - b. Comparison of field data with laboratory data
 - c. Analysis such as pH, turbidity, conductivity, dissolved oxygen, chemical oxygen demand (COD), using field instruments and multi-parameter probes
 4. Field monitoring techniques for air
 - a. Various type of air contaminants (heavy metals, asbestos, mold etc.)
 - b. Basic instruments and air sampling methods
 - c. Safety training
 - d. Comparison of field data with laboratory data

VI. INSTRUCTIONAL METHODOLOGY

- A. Assignments
1. **In-class assignment:** Preparation of field log and Chain of Custody documentation
 2. **In-class assignment:** Equipment calibration and trouble shooting
 3. **In-class assignment:** Performing laboratory exercises, such as monitoring for pH, turbidity, conductivity, etc
 4. **In-class assignment:** Interpretation and documentation of the experimental data in the field log
 5. **In-class assignment:** Field trips to environmentally regulated testing sites for monitoring and observation
 6. **Out-of-class assignment:** Assigned readings on concepts and techniques, such as pH, turbidity, conductivity etc.
 7. **Out-of-class assignment:** Study of protocols prior to each field/lab exercise
- B. Evaluation
1. **Other:** Completion of laboratory exercises (such as those described above) and demonstration of teamwork with other students
 2. **Other:** Demonstration of proper record keeping in log sheets and the Chain of Custody documentation
 3. **Other:** Demonstration of proper use of equipment and clean up of the work area
 4. **Other:** Lab practical emphasizing the regulation of water, including requirements for testing water quality in the field vs. the certified laboratory
 5. **Other:** Written quizzes on topics such as appropriate preparation for field monitoring and Chain of Custody documentation
 6. **Other:** Final exam a. Lab practical on laboratory exercises such as pH, turbidity, conductivity monitoring b. Written exam on topics such as interpretation and documentation of field log data, correct equipment to use for air monitoring or water monitoring
- C. Representative Textbooks and Other Instructional Materials
1. Instructor developed handouts such as on air, water, and soil testing and laboratory/field monitoring protocols
 2. EPA codes of federal regulations on water and air quality

3. Field instrumentation manuals and materials such as the instructional manual for the multi-parameter probes
4. Instructor prepared power point presentations on the related topics such as air, water and soil
5. Website: Credential web sites related to envirommental monitoring techniques
6. Website: Credential web sites related to environmental monitoring techniques

VII. TITLE 5 CLASSIFICATION

CREDIT/DEGREE APPLICABLE (meets all standards of Title 5. Section 55002(a))

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