



# Broward Community College

## Course Outline

STATUS:   A  

COMMON COURSE NUMBER:   EVS 2893C  

COURSE TITLE:   Environmental Sampling and Analysis  

CREDIT HOURS:           5          

**CONTACT HOURS BREAKDOWN:**

Lecture/Discussion	<u>          48          </u>
Lab	<u>          64          </u>
Other	<u>          0          </u>
Contact Hours/Week	<u>          7          </u>

**CATALOG COURSE DESCRIPTION:**

Prerequisite: CHM 1025 and CHM 1025L, CHM 2120 and CHM 2120L

Corequisite: None

This course provides an introduction to EPA and DEP-approved methods for the collection and analysis of environmental samples. The laboratory is integrated with class theory. Topics include; sampling of water, soils, sediments and hazardous waste; application of field and laboratory-based analytical methods; documentation procedures; method validation including generation of precision, accuracy, and detection limits; writing comprehensive and project-specific quality assurance plans.

General Education Requirements - Associate of Arts Degree, meets Area(s):

General Education Requirements - Associate in Science Degree, meets Area(s):

**UNIT TITLES:**

1. Sampling Protocols
2. Analytical Methods
3. Method Validation
4. Regulation of Environmental Laboratories
5. Field Trips

LAST REVIEW   Academic Year 2006-07  

*Interim Revision Dates:*

NEXT REVIEW   Academic Year 2011-12

## **I. Course Overview:**

Upon successful completion of this course, the students should be able to collect environmental samples of various matrices and perform basic chemical and microbiological test procedures according to standard protocols; generate data that describes the precision, accuracy, and detection limits of the protocols; and discuss State requirements governing the collection and analysis of environmental samples.

## **II. Units:**

### **Unit 1. Sampling Protocols**

#### General Outcome:

1.0 The students should be able to demonstrate a familiarity with the methods for collecting, preserving and documenting the collection of environmental samples.

#### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 1.1 Collect industrial and domestic wastewater samples.
- 1.2 Collect ground and surface water samples.
- 1.3 Collect soil, sediment, and hazardous waste samples.
- 1.4 Perform documentation to support sample collection.
- 1.5 Perform sample preservation.
- 1.6 Recognize sampling equipment material and parameter incompatibilities.

## Unit 2. Analytical Methods

### General Outcome:

2.0 The students should be able to perform basic environmental analytical methods, calculate results for solid and aqueous matrices, calibrate instruments, and perform basic laboratory support functions.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

2.1 Calibrate and operate basic field equipment including pH meter conductivity meter, global positioning system unit, and dissolved oxygen meter.

2.2 Prepare common laboratory reagents.

2.3 Describe hazardous materials used in the lab and discuss methods for their safe handling and disposal.

2.4 Describe equipment and glassware cleaning protocols.

2.5 Perform microbiological analyses using the membrane filter technique.

2.6 Perform titrimetric procedures such as chlorine and alkalinity.

2.7 Perform colorimetric procedures such as COD, cyanide, and phenol.

2.8 Perform gravimetric procedures such as suspended, dissolved, and volatile solids.

2.9 Perform electrometric procedures such as DO-BOD and fluoride.

2.10 List and discuss methods used to determine metals and organic compounds in environmental samples.

2.11 Perform sample preparation operations such as filtration, digestion, and extraction.

2.12 Perform documentation to support analytical operations.

### Unit 3. Method Validation

#### General Outcome:

3.0 The students should be able to design experiments, generate data, and calculate statistics to describe the precision, accuracy, and detection limit of analytical protocols.

#### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

3.1 Select appropriate concentration ranges and prepare spiked samples for the purpose of determining analytical precision, accuracy, and detection limits.

3.2 Calculate precision, accuracy, and detection limits.

3.3 Define the meaning and purpose of various QA/QC terms such as field blanks, trip blanks, method blanks, spikes, controls, sensitivity, etc.

## Unit 4. Regulation of Environmental Laboratories

### General Outcome:

4.0 The students should be able to demonstrate a knowledge of state regulatory bodies that oversee environmental laboratories in Florida, certification requirements, and the elements of comprehensive and Project-specific Quality Assurance Plans.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 4.1 Discuss the role of the EPA, DEP, HRS in environmental laboratory oversight.
- 4.2 Discuss the elements of Comprehensive and Project-Specific QA Plans.

## Unit 5. Field Trips

### General Outcome:

5.0 The students should be able to recognize advanced laboratory technologies currently used to analyze solid and aqueous matrices. Field trips to various laboratories in the area will be conducted for that purpose.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to demonstrate a familiarity with the use and applications of instrumentation such as:

- 5.1 Gas Chromatography/Mass Spectrometry (GC/MS)
- 5.2 Atomic Absorption (AA) Flame and Graphite Furnace techniques
- 5.3 Inductively Coupled Plasma Analyzer (ICP)
- 5.4 Ion Analyzer
- 5.5 Other Current Instrumentation