

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE; SAMPLING AND MONITORING

CODE NO.; WTR 310-4

SEMESTER; VI

PROGRAM; WATER RESOURCES ENGINEERING TECHNOLOGY

AUTHOR; SUBHASH VERMA. P.Eng

DATE; APRIL 1997

PREVIOUS OUTLINE DATED; N/A

APPROVED:


DEAN

DATE

TOTAL CREDITS; 4

PREREQUISITE(S); NONE

LENGTH OF COURSE: 16 WEEKS TOTAL CONTACT HOURS; 48

COURSE NAME

CODE NO.

L COURSE DESCRIPTION:

This course deals with the principles and practical aspects of environmental sampling and monitoring. Planning, sampling, analysis, quality assurance and data reporting are discussed for air, water, solids and liquids and micro biological samples. Special requirements for sampling devices, containers and preservatives as well as accepted sampling and monitoring procedures will be included.

n. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will demonstrate the ability to:

- 1) Differentiate between sample types and techniques.

Potential Elements of the Performance;

- define grab sample and composite sample
- describe the advantages of manual and automatic sample collection
- compare the various protocols to collect a grab and a composite sample

- 2) Carry out the complete sampling activity including preparation, collection and submission of the samples.

Potential Elements of the Performance:

- describe the elements of preparation for a sampling visit
- explain the correct procedure for collecting and preserving a sample
- complete the sample submission record

- 3) Program and install an automatic sampler.

Potential Elements of the Performance:

- describe the sequential and grouped samples
- program the automatic sampler to collect sequential and grouped samples
- install the sampler at a given inspection point

COURSE NAME

CODE NO.

**BL LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
(Continued)**

- 4) Relate the sampling method to the sampling activity.

Potential Elements of the Performance:

- identify and describe the key elements of a sampling plan
- develop and prepare a written sampling plan
- understand and apply quality assurance procedures

- 5) Describe various flow monitoring devices.

Potential Elements of the Performance:

- describe the types of flow conditions
- describe various methods of estimating flow
- measure and estimate the flow in the field

- 6) Calculate the flow rate and manually prepare a flow proportion composite sample.

Potential Elements of the Performance:

- calculate the flow rate from field measurements
- determine the sample aliquot volumes to make a flow proportioned composite sample
- program the automatic sampler to collect a flow proportioned sample

- 7) Collect a legal sample.

Potential Elements of the Performance:

describe the procedure for collecting a legal sample
complete the chain of custody form, log book
understand and interpret lab analytical results

COURSE NAME

CODE NO.

- 8) Select appropriate sampling methods for monitoring surface water, groundwater, air soil, air quality and industrial discharges.

Potential Elements of the Performance:

- know different air-sampling instruments and technologies and how they relate to sampling strategies
- describe the standard protocol to gather groundwater samples

m. TOPICS:

1. Introduction:
 - 1.1 Sampling
 - 1.2 Factors affecting sampling
 - 1.3 Representative of a sample
 - 1.4 Sample integrity
 - 1.5 Units of Measure
2. Sampling Considerations:
 - 2.1 Types of samples
 - 2.2 Manual compositing
 - 2.3 Sample container
 - 2.4 Sampling location
 - 2.5 QA/QC
3. Sampling Methods
 - 3.1 Manual sampling equipment
 - 3.2 Automatic sampling devices
 - 3.3 Set up and installation
 - 3.4 Programming a sampler
 - 3.5 Maintenance
4. Sample Handling
 - 4.1 Analytical considerations
 - 4.2 Sample containers
 - 4.3 Sample preservation
 - 4.4 Transportation of a sample
 - 4.5 Legal sampling

COURSE NAME

CODE NO.

5. Flow Measurement:
 - 5.1 Hydraulic principles
 - 5.2 Pipe flow measurement
 - 5.3 Open channel flow measurement
 - 5.4 Flow paced sampling
 - 5.5 Flow estimation
6. Sampling Techniques/Procedures:
 - 6.1 Soil investigation
 - 6.2 Groundwater sampling
 - 6.3 Air sampling
 - 6.4 Health and Safety
 - 6.5 Sampling plans

IV. REQUIRED RESOURCESyTEXTS/MATERIALS:

1. M. Ostler, N.K, etal 1996, Sampling and Analysis, Vol 4, Prentice Hall
2. MOEE, 1996, Sampling Manual for Law Enforcement Officers (draft)

ADDITIONAL:

1. MOEE, 1993, A Guide to the Collection and Submission of Samples for Laboratory Analysis, Government Publications, Toronto, Ontario
2. MOEE, 1991, Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater
3. MOEE, 1988, MIS A Monitoring Training Manual
4. MOEE, 1988, Model Sewer Use By-Law
5. USEPA, Handbook for Sampling and Sample Preservation of Water and Wastewater
6. Keith, L.H., 1991. Environmental SampUng and Analysis. Lewis Publishers
7. Cheremisinoff, P., Manganiello, B., 1997. Environmental Field Sampling Manual. Pudvan Publishing Co.
8. Smeley, C.K., NPDES Storm Water Sampling Guidance Manual. US EPA, Office of Water

COURSE NAME

CODE NO.

V. EVALUATION PROCESS/GRADING SYSTEM**Final mark in the course:**

Unit Test I 25%
Unit Test n 25%
Final Test 50%

A+= 90-100%	A= 80-89%
B= 70-79%	C= 60-69%
R= Below 60%	

VI. SPECIAL NOTES:

- Special Needs
If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.
- Retention of Course Outlines
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.
- Disclaimer for Meeting the Needs of the Learners
Substitute Course Information is available at the Registrar's Office.
- Any Other Special Notes appropriate to your course.

Vn. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor.