DOC.#551

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: ANALYTICAL CHEMISTRY (INSTRUMENTAL II)

CODE NO.: CHM 231 - 5 SEMESTER: VI

PROGRAM: WATER RESOURCES ENGINEERING TECHNOLOGY

AUTHOR: L. VANDERZWET/B. KIRK

DATE: APRIL 1995 PREVIOUS OUTLINE DATED: APRIL 1994

APPROVED: _____ April 06/95
DEAN DATE

'ER RESOURCES | CHM231-5

JRSE NAME | COURSE NUMBER

TAL CREDIT HOURS: 5

EREQUISITE(S): CHM221 - ANALYTICAL I

. PHILOSOPHY/GOALS:

nalytical Chemistry (Instrumental II) expands on topics covered in the irst instrumental course (CHM221). As well, other relevant analytical ethods will be discussed. Other major goals include developing the bility to determine the appropriate procedures for the collecting, torage and sampling of soil and water samples.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will be able to:

1. Describe the theory of electrochemistry and electrochemical cells, including half cells.

2. Understand the different types of reference and indicator electrodes and electrometric methods of analysis, including pH meters, specific ion electrodes and polarography.

3. Understand the principles behind other relevant analytical methods employed in the analysis of samples.

4. Determine the proper sampling and storage procedures for soil and water samples, based on sample size, required determinations, homogeneity of sample, possible sources of contaiminants, etc.

5. Determine the best method of sample preparation and analysis, based on sample size, required determination, concentrations, costs, etc.

WATER RESOURCES — COURSE NAME

CHM231-5 — COURSE NUMBER

III. TOPICS TO BE COVERED:

a) THEORY

Hours	Topics
1	1. Course Introduction
4	2. Review of Electrochemical Theory
6	3. Electrometric Methods of Analysis
6	4. Principles of mass spectrometry, ICP and other relevant methods of analysis
9	5. Sampling and Storage Procedures of Soil and Water Samples
6	6. Choosing the best method of analysis
5	7. Tests/Exam

b) LABORATORY

The student will complete five experiments designated for this course, in the alloted time. A major component of these experiments will be sample preparation. The exact experiments will depend on those completed in CHM221 but can include:

- Specific Ion Electrode (F^-, NO^{3-})
- Gas Chromatography (solvents)
- Atomic Absorption (heavy metals)
- Spectronic Colourimeter (Co^{+3}/Cr^{+3})
- HPLC (anions)
- Titroprocessor (acidity/alkalinity)
- Kjeldahl (nitrogen)
- Double beam spec (phosphate/phenol)
- Total Carbon

The student will be able to subject their results to statistical analysis and determine:

1. Precision
2. Relative Error
3. Average Deviation
4. Standard Deviation
5. Whether a result should be excluded by the 2.5d rule, 4.0d rule and the Q test.

WATER RESOURCES | CHM231-5

COURSE NAME | COURSE NUMBER

IV. EVALUATION METHODS:

Grades:		
	> 90%	- A+
	80 - 89%	- A
	70 - 79%	- B
	60 - 69 %	- C
	< 60%	- R

The final grade is arrived at by totalling the theory marks (50%) and the lab marks (50%).

The theory mark is the sum of all tests, assignments and final examinations. Assignments and labs are due on the date specified and late assignments and labs will not be accepted. The lab mark is the sum of all marks awarded for the analysis plus the written report for each of the five experiments. The analysis is graded on accuracy and precision while the lab report graded on format, content and neatness.

Your grade will be greatly affected by attendance at scheduled classes and labs. Eighty-five percent attendance is required at all theory classes while 100% is needed for all labs.

V. REQUIRED STUDENT RESOURCES:

Textbook:

Braun, Robert, D., Introduction to Chemical Analysis, McGraw Hill, 1982.

Supplemental Texts and References:

A number of texts on analytical chemistry are available in the school library.

VI. SPECIAL NOTES:

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.