SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	DEVELOPMENTAL CHEMISTRY
CODE NO.:	CHM099-3 **SEMESTER:** 1 OR 2
PROGRAM:	GENERAL ARTS & SCIENCE/ENVIRONMENTAL ENG. WATER RESOURCES/PULP & PAPER
AUTHOR:	MANFRED ENGEL
DATE:	JULY 1992 **PREVIOUS OUTLINE DATED:** JULY 1991

APPROVED: _____   _June 2/92_
                    DEAN   DATE

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CODE NO.: CHM035-3   SEMESTER: 1 OR 2

PROGRAM: GENERAL ARTS & SCIENCE/ENVIRONMENTAL ENG.
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DEVELOPMENTAL CHEMISTRY	CHM099-3
COURSE NAME	**COURSE NUMBER**

TOTAL CREDIT HOURS: 48

PREREQUISITE(S): None

I.   PHILOSOPHY/GOALS:

The course is designed to provide an introduction to general chemistry for students with little or no secondary school chemistry. Upon successful completion, the student will have the necessary entrance qualifications to pursue studies in Nursing, Water Resources, Environmental Engineering and Pulp and Paper.

II.   STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will:

1.   Have a general understanding of the Atomic Structure and the Periodic Table.

2.   Able to write formulas of compounds and write equations of chemical reactions.

3.   Perform simple chem. calculations based on the Mole Concept.

4.   Do calculations based on the Ideal Gas Law and calculate solution concentrations.

III.   TOPICS TO BE COVERED:

1.   Chemistry, Matter and Energy.
2.   Structure of Matter.
3.   Electron Configuration and the Periodic Nature of Elements.
4.   Bonding and Naming of Compounds.
5.   Chemical Reactions and quantitative relationships. (the Mole)
6.   States of Matter.
7.   The Gas Laws.
8.   Solutions.

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IV. LEARNING ACTIVITIES:

REQUIRED RESOURCES

Text: Chemistry - an Introduction

1. Matter

The student will be able to:

1. Explain what matter is.
2. Describe physical and chemical properties of matter.
3. Give a classification of Matter.

Study Chapter 1 - Matter pp. 1-18
Complete teacher assigned questions from:

page 18 What is Matter   Q 1.1-1.4
page 18 Properties   Q 1.5-1.7
page 19 Model   Q 1.8-1.16
page 19 Classification   Q 1.17-1.22

2. Atoms and Molecules

1. Use chemical element symbols to write formulas for compounds.
2. Calculate molecular weights of compounds.
3. Determine the No. of Protons, Neutrons & Electrons in Atoms.
4. Calculate the masses of isotopes.
5. Use the mole concept to determine relationships between number of moles, number of grams and number of atoms for elements and compounds.

Study Chapter 3 - pp. 53-74
Complete assigned questions.

page 75 Symbols and
         Formulas   Q 3.1-3.3
page 75 Masses   Q 3.4-3.9
page 76 Isotopes   Q 3.10-3.15
page 76 The Mole   Q 3.16-3.34

or complete "Worksheets 1 and 2".

3. Electronic Structure

1. Locate elements on the Periodic Table from period and group designations.
2. Determine the arrangements of electrons in shells, subshells and orbitals of elements.
3. Relate electronic structure to the location of the elements on the Periodic Table.
4. Classify elements into metal, nonmetal, metalloid, noble gas and transition element.

Study Chapter 4 pp. 79-99
Complete assigned questions.

page 100 The Periodic
          Table   Q 4.1-4.3
page 100 Atomic
          Structure   Q 4.4-4.13
page 100 Electron
          Configurations   Q 4.14-4.22

or complete "Worksheets".

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IV. LEARNING ACTIVITIES: (cont'd)   **REQUIRED RESOURCES:**

4. Forces between particles   Study Chapter 5 pp. 104-129
     (Bonding)   Complete assigned questions

1. Define ionic and covalent   page 130 Electron
   bonding.   Arrangements   Q 5.1-5.12
2. Use the octet rule predict   Ionic bonding Q 5.4-5.12
   the ions formed during the   page 131 Covalent
   formation of ionic compounds.   Bonding   Q 5.13-5.20
3. Represent simple covalent   page 132 Polyatomic
   molecules and polyatomic ions   Ions   Q 5.21-5.24
   by electron dot formulas.
4. Name and write formulas of   and complete worksheet on Naming
   binary and polyatomic   of compounds.
   compounds.
5. Use electronegativities to
   determine the type of bonding
   that is likely to occur.

5. Chemical Reactions and   Study Chapter 6 pp. 133-157
     Stoichiometry   Complete assigned questions.

1. Identify reactants and   page 157 Chemical
   products in written   Equations   Q 6.1-6.4
   equations.   page 158 Oxidation
2. Balance simple reactions.   Numbers   Q 6.5-6.11
3. Assign oxidation numbers to   page 159 Types of
   elements in chemical   Reactions   Q 6.12-6.18
   formulas.   page 160 Mole
4. Classify reactions as redox,   Concept   Q 6.25-6.36
   non redox, decomposition,
   combination or replacement
   types.
5. Use the Mole concept to do
   simple calculation based on
   chemical reactions.

6. States of Matter   Study Chapter 7 pp.163-181
                                         Complete assigned questions.

1. Explain properties of matter   page 183 Change in
   such as density compressi-   State   Q 7.18-7.19
   bility, thermal expansion.
2. Explain relationship between
   states of matter and energy.

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IV. LEARNING ACTIVITIES: (cont'd)	REQUIRED RESOURCES:

7. <u>The Gas Laws</u>

    Study Chapter 8 pp. 185-197
    Complete assigned questions.

1. Do calculations based on
   Boyles' Law, Charles' Law and
   the Comnbined Gas Law.

    page 206 Gas Laws   Q 8.1-8.23

    Complete "Worksheet" on Gas Laws.

8. <u>Solutions</u>

    Study Chapter 9 pp. 210-231.
    Complete assigned questions.

1. Be able to identify solutes
   and solvents in solutions.

    page 234 Solutions   Q 9.1-9.6
    page 235 Solution

2. Write definition of the term:
   soluble and insoluble
   substances, immiscible,
   saturated and super saturated
   solution.

    Concentrations   Q 9.12-9.19

3. Calculate solution
   concentrations in units of
   molarity, weight/weight
   percent, weight/Vol percent
   and Volume/volume percent.

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V. EVALUATION METHODS:

The students final mark for this course will be based on the following:

    Topic tests   100%

Grades reported on your transcript are based on a weighted average of test scores on the following basis:

    90 - 100%   A+
    80 - 89%   A
    65 - 79%   B
    55 - 64%   C
     0 - 54%   R or X

The method of calculating a weighted average is described in your student handbook.

All tests are scheduled in advance. Hence attendance for tests is mandatory. Unexcused absence from a test will result in a mark of zero for that test. A student may be prevented from attending a test by illness or bereavement. Upon return to classes, the student must see the instructor at the end of the first class attended to arrange a time and place for a make up test. In addition, if the absence is do to illness the student must present a note from the student's doctor or from the College nurse.

VI. REQUIRED STUDENT RESOURCES:

Chemistry - An Introduction by Michael R. Slabaugh & Spencer L. Saeger, West Publishing Company.

VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

Books with Titles such as: Introduction to Chemistry or General Chemistry; especially "In Preparation for College Chemistry", W. S. Seese, G. W. Daub.

Computer programs on Chemistry in the Learning Assistance Centre.

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VIII. 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.