

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

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APPROVED: _____ DATE _____
DEAN



DEVELOPMENTAL CHEMISTRY

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

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IV. LEARNING ACTIVITIES:

REQUIRED RESOURCES

Text - Basic Chemistry - Sixth Ed.

I. MEASUREMENT - (OPTIONAL)

The student will be able to:

Study Chapters 2, 2.1 to 2.6 and 2.8-2.9. Complete teacher-assigned questions.

1. Define matter and its chief characteristics.
2. Explain mass, weight, volume, length, and density (metric system).
3. Describe three commonly used temperature scales.
4. Identify and explain the workings of measuring devices for various characteristics of matter.
5. Perform basic calculations and round off the answer to the correct number of significant digits
6. Employ the factor-unit method to make conversions within the metric system and temperature scales.
7. Define and calculate the density and specific gravity of various forms of matter.

P. 42, Q. 1-4

P. 42, Q. 5-10

P. 44, Q. 19-30

P. 44, Q. 31-39.

II. MATTER AND ENERGY -

Study Chapter 3, pp. 47-66. Complete assigned questions.

1. Define the three states of matter and differentiate between homogeneous and heterogeneous matter.
2. Identify elements from symbols and provide a symbol for a given element.
3. Determine the number and identity of atoms in a substance from its molecular formula or formula unit.
4. Identify physical and chemical properties and changes of pure substances.

P. 66, Q. 3 and 5

P. 66, Q. 4

P. 67, Q. 6,7

P. 67, Q. 8-11

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IV. LEARNING ACTIVITIES: (cont'd)

REQUIRED RESOURCES:

5. Define the laws of conservation of matter.
6. Distinguish between metallic and non metallic elements.

p. 68, Q. 18-25, Further selected problems may be assigned.

III THE STRUCTURE OF THE ATOM -

Study Chapter 4, pp. 71-88
Complete Assigned Questions

1. Define atomic mass and explain its importance. Identify Dalton's theory of the atom and its support and rejection by modern chemists.
2. Characterize three major subatomic particles and give one theory on their general arrangement.
3. Explain the difference in structure of two isotopes of the same element and the affects on the atomic mass.
4. Describe the various electron principal energy levels of the atom and how they are filled.
5. Construct electron-dot formulas for elements.

p. 91, Q. 5,6

p. 91, Q. 7-10

p. 91, Q. 11-13

p. 92, Q. 14,15

IV. PERIODIC CLASSIFICATION OF ELEMENTS -

Study Chapter 5, pp. 95-103
Complete assigned questions

1. Explain the periodic law in terms of properties of the elements.
2. Describe the structure of the periodic table (periods and groups) and distinguish between representative and transition elements.
3. Identify metals, nonmetals, metalloids, or noble gases from the periodic table.
4. Using the period table, identify common patterns within groups of the elements.

pp. 104,105, Q. 3,4,11,12

pp. 104,105, Q. 5-10,13,14

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IV. LEARNING ACTIVITIES: (cont'd)

REQUIRED RESOURCES:

V. THE STRUCTURE OF COMPOUNDS -

Study Chapter 6, pp. 107-133
Complete assigned questions

1. Explain the importance of chemical bonds and identify how ionization energy and electron affinity influence chemical bonding.
2. Describe how two atoms form an ionic bond.
3. Trace the formation of a covalent bond.
4. Create Lewis structures and structural formulas for various molecules and formula units.
5. Write chemical formulas for a variety of compounds and formula units.
6. Using the period table, make predictions about some bonding traits of the elements.

p. 134, Q. 6,7

p. 134, Q. 8,9

p. 134, Q. 10,11

p. 135, Q. 12, 13

pp. 135,135, Q. 14,15,16

VI. CHEMICAL NOMENCLATURE
(INORGANIC COMPOUNDS) -

Study pp. 139-151
Complete assigned questions

1. Explain why the use of systematic nomenclature is beneficial to chemistry students.
2. Identify the rules for naming and be able to name binary compounds containing two nonmetals and binary compounds containing one nonmetal and one metal.
3. Determine names from formulas and formulas from names for ternary and higher compounds.
4. Distinguish between acids, bases, and salts and be able to name these compounds.

p. 154, Q. 6-9

p. 155, Q. 10-13

p. 155, Q. 14-17

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IV. LEARNING ACTIVITIES: (cont'd)

REQUIRED RESOURCES:

VII. CALCULATIONS - ELEMENTS AND COMPOUNDS-

Study Chapter 8, pp. 159-176
Complete assigned questions
p. 177, Q. 3,4

1. Calculate formula or molecular mass of a compound.
2. Use Avogadro's number to interconvert between moles of a compound and quantity of the compounds.
3. Explain how molar mass differs from molecular mass.
4. Calculate percent composition
5. Determine empirical formulas.
6. Given empirical formula and molecular mass of a compound, determine its molecular formula.

p 177, Q. 5-12

p. 179, Q. 17-20

p. 179, Q. 21,22

p. 180, Q. 23-27

Further selected problems may be assigned.

VIII CHEMICAL EQUATIONS -

Study Chapter 9, pp. 183-202

1. Identify terms and symbols used by chemists in writing chemical equations.
2. Balance variety of chemical equations.
3. Describe and balance examples of:
 - a) decomposition reactions
 - b) single-replacement reactions
 - c) double-replacement reactions
 - d) neutralization reactions

p. 204, Q. 4-7

p. 205, Q. 8-12

p. 206, Q. 13

p. 207, Q. 14

p. 207, Q. 15

p. 207, Q. 16

p. 207, Q. 17 Further selected problems may be assigned

4. Define stoichiometry and work through simple problems using stoichiometry.

IX. GASES -

Study Chapter 11, pp. 235-252

1. Describe the kinetic theory and identify various units of pressure.
2. Use Boyle's law, Charles' law, and Guy-Lussac's law to solve various problems.
3. Combine the gas laws to solve various problems.

p. 260, Q. 8-19

p. 261, Q. 20-28

X. SOLUTIONS -

Study Chapter 14, pp. 309-325

1. Distinguish between a solvent and a solute in a solution.
2. Describe the most common combinations of states of matter to form a solution.
3. Identify three factors that affect solubility and three factors that affect the rate of solubility.
4. Explain the differences among saturated, unsaturated, and supersaturated solutions.

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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 due to illness the student must present a note from the student's doctor or from the College nurse.

VI. REQUIRED STUDENT RESOURCES:

"Basic Chemistry" - Alternate Edition by G. William Daub and William Seese - Sixth Edition

(A calculator will be useful although not necessary).

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.

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.