

I. COURSE DESCRIPTION:

This course examines topics of science that provide a fundamental understanding of the relationship of scientific research, biology and chemistry to natural resource management. Topics include Science and the Scientific Method, The Hierarchy of Matter, The Species in an Evolutionary Context, Use of the Periodic Table, The Cell as the Fundamental Unit of Life, Water as a Medium for Life and Chemical Interactions in the Environment

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Explain and apply the scientific method to natural resource problem solving

Potential Elements of the Performance:

- distinguish between science and technology
- describe the steps in the scientific method
- using the scientific method demonstrate how you would solve a given natural resource problem
- prepare a technical report to describe the results of a lab analysis of waste recycling at Sault College
- describe the organization and purpose of each section of a technical report

2. Explain the Hierarchy of Matter.

Potential Elements of the Performance:

- show the connectivity and increasing complexity of nature from atomic particles to the total ecosphere
- demonstrate the dependence of all levels of nature on chemical interaction
- show how chemistry, biology and ecology are inter-related through the hierarchy of matter

3. Explain the relationship of species to evolutionary process

Potential Elements of the Performance:

- describe the various criteria used to determine species status
- explain the basis for classifying living organisms

- categorize select examples of specimens from the field into their respective taxonomic groups
- correctly use the binomial system of classification
- give examples of morphological, anatomical, physiological, behavioral and ecological characteristics used to distinguish species

4. Explain cellular functions

Potential Elements of the Performance:

- identify the fundamental components of a living cell and explain their functions
- characterize and provide examples of the 4 basic life molecules: sugars, proteins, lipids and nucleic acids
- explain how cells obtain nutriment
- summarize the processes of photosynthesis, respiration, diffusion, protein synthesis and exchange of genetic information
- demonstrate division of function in multi-cellular organisms

5. Explain various characteristics of water as they relate to life systems.

Potential Elements of the Performance:

- describe various chemical and physical properties of water including: density, viscosity, polarity, surface tension, specific heat, solubility and pH
- determine the dissolved oxygen concentration of water using a titration method
- calculate acid/base neutralizations
- determine the pH of water using a titration method and a pH meter
- explain thermal stratification of lakes and lake turnover

6. Demonstrate the relationships of chemical interactions to important global environmental issues

- Potential Elements of the Performance: explain bio-magnification
- describe the causes for and impacts of the following global environmental problems:
 - i) acid deposition
 - ii) ozone depletion
 - iii) global warming
 - iv) eutrophication

7. Develop use of the compound microscope

Potential Elements of the Performance:

- use a compound microscope to observe and draw cellular material
- measure size of microscopic materials
- calculate the scale of drawings
- demonstrate proper care and handling of the microscope

8. Develop safe and correct lab technique with respect to chemical handling and instrument use.

Potential Elements of the Performance:

- discuss and apply safe lab procedures including handling of dangerous chemicals
- demonstrate knowledge of the Workplace Hazardous Materials Information System
- demonstrate use of balances, pH metre, glassware including pipettes and burettes, hot plates, fume hoods
- prepare solutions
- conduct titration procedures

9. Develop a working knowledge of the periodic table

Potential Elements of the Performance

- distinguish between metals, non-metals and noble gasses
- demonstrate relationships between protons, electrons and neutrons in identifying chemical elements
- determine electron configurations of atoms
- identify valence shells and valence electrons
- determine potential atomic arrangements of ions and covalent compounds
- calculate gram molecular weights of compounds
- demonstrate use of Lewis dot diagrams
- use tables to determine energy changes in combustion reactions

III. TOPICS:

1. The Hierarchy of matter
2. Science and the scientific method
3. The species in an evolutionary context
4. Use of the Periodic Table
5. Chemical interactions in the environment
6. Water as a medium for life
7. The cell as the fundamental unit of life

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Science & Nature Lab Manual, Science & Nature Study Guide, Lab Coat
Lab safety glasses and calculator. (NOTE: a cell phone will not be allowed as a calculator in tests).

V. EVALUATION PROCESS/GRADING SYSTEM:

3 Unit Tests	60% (Each unit test is worth 20%)
<u>6 Labs</u>	<u>40%</u> (Each lab is worth 6.67%)
TOTAL	100%

The following semester grades will be assigned to students:

Grade	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the	

NR	requirements for a course.
W	Grade not reported to Registrar's office. Student has withdrawn from the course without academic penalty.