

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: ENVIRONMENTAL SCIENCE

CODE NO: SCI115-3

SEMESTER:

PROGRAM: FORESTRY/RENEWABLE RESOURCE/FISH & WILDLIFE/
PARKS & OUTDOOR/ABORIGINAL RESOURCE TECHNICIAN

AUTHOR: JERRY ZUCHLINSKI

DATE: JUNE 1995 **PREVIOUS OUTLINE DATED:** DECEMBER 1993

APPROVED:
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TOTAL CREDIT HOURS: 48

PREREQUISITE(S): None

I. PHILOSOPHY/GOALS:

An introductory course to give students a basic understanding of the relationships of science and technology; ways in which humans have applied such knowledge in the modification of their immediate environment; and the impacts of those modifications on global sustainability of ecosystems. Laboratory sessions will provide an understanding of how humans apply scientific knowledge and manipulate matter and provide technical skills related to laboratory safety, scientific procedure and microtechnique.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course students will be able to:

1. Distinguish between science and technology.
2. Describe characteristics of the human species which contribute to its technological nature.
3. Describe various aspects of ecosystem structure including:
 - i) energy flow
 - ii) nutrient cycling
 - iii) organization of matter
 - iv) interdependency of organisms
4. Describe physical characteristics which distinguish non-living matter such as mass, volume, density, specific gravity, states of matter, mixtures and solutions.
5. Describe characteristics which distinguish living matter such as, cellular structure, growth, nutrition, and reproduction.
6. Read information such as chemical symbols, atomic organization and atomic mass from the periodic table.
7. Demonstrate dependency and vulnerability of life processes in relation to natural and human induced chemical processes.
8. Describe the differences between metals and nonmetals; ionic and covalent compounds; organic and inorganic compound; and acids and bases.

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II. STUDENT PERFORMANCE OBJECTIVES: (continued)

9. Describe the basic life molecules which make up plants and animals including: carbohydrates, lipids, proteins and nucleic acids.
10. Describe basic strategies of obtaining nutrition and trace the intake and movement of any nutrient into and through a plant or animal.
11. Differentiate between the processes of osmosis, diffusion, dialysis, and active transport.
12. Based on a general understanding of natural processes, demonstrate how various technologies have impacted on the global environment with special emphasis on:
 - i) acid rain
 - ii) ozone depletion
 - iii) greenhouse effect
 - iv) deforestation
 - v) organic toxins
 - vi) overpopulation
 - vii) eutrophication
 - viii) soil degradation
13. Demonstrate mastery of the compound microscope.
14. Prepare proper scientific diagrams and technical reports.
15. Demonstrate knowledge in a laboratory setting of:
 - a) standard lab equipment and its use
 - b) safety considerations and procedures related legislation

PROPOSED LAB SESSIONS; There will be seven laboratory sessions for the purpose of:

1. familiarizing students with laboratory equipment, safety procedures, and basic technique.
2. providing practical demonstrations that reinforce what was studied in theory classes.

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LAB * TOPIC

1. a) Guarding against Harmful Chemicals
b) Solid Waste Output: An Application of Measurement
2. Humanity's Technological Beginnings: The Control and Power of Energy
3. Identification of Matter: The Densities of Liquids and Solids
4. Manipulating Matter: The Separation of Components of a Mixture
5. Acidic Environments: pH and Neutralization of Acids and Bases
6. A Microscopic View of Life: A Comparison of Plant and Animal Cells.
7. The Movement of Matter: Air, Water and Organisms as Mediums for Particle Transport

III. TOPICS TO BE COVERED:

| Unit | Week | Description |
|-------------|-------------|--|
| 1 | 1 | Technology: The Application of Science - accumulation of scientific knowledge - documentation and access of scientific knowledge - technological feedback loops |
| 2 | 2,3,4 | Predictable Qualities of Matter: A Basis for Manipulation and Disruption - the hierarchy of matter - periodicity of the elements - identification of matter - atomic structure - chemical bonding |
| 3 | 5,6 | Characteristics of Living Organisms - biochemical structure - cellular organization |
| 3 | 7,8 | Fundamentals of Ecosystem Structure - interactions of air, water, and land - energy flow - nutrition and nutrient cycling - population growth |

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III. TOPICS TO BE COVERED: (cont'd)

| Unit | Week | Description |
|------|-------|--|
| 4 | 9 | <u>Homo sapiens</u> t The Technological Species - human characteristics - human wants and needs - environmental impact |
| 5 | 10,11 | Chemical Technology - inorganic chemicals - organic chemicals - biological chemicals |
| 6 | 12,13 | Impacts of Industrial Activity - Acid rain - Ozone depletion - Solid wastes |
| 7 | 14 | Impacts of Agriculture and Forestry - soil degradation and erosion - eutrophication of lakes - deforestation and extinction |
| 8 | 15 | Impacts of Transportation - biotic redistribution - greenhouse effect - diseases |
| 9 | 16 | Impacts of Energy Production - nuclear wastes - damming of rivers |

IV. METHODS OF EVALUATION:

Students will be graded on the basis of their performance in three theory tests, seven laboratory exercises, and five assignments.

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|----------------------|------------|
| Term Tests | 50% |
| Laboratory Exercises | 35% |
| Assignments | <u>15%</u> |
| | 100% |

| | |
|-------------|-----------|
| Grading: A+ | 90 - 100% |
| A | 80 - 89% |
| B | 70 - 79% |
| C | 60 - 69% |
| R | 0 - 59% |

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IV. METHODS OF EVALUATION:

Special Considerations:

1. Late labs and assignments will be downgraded at a rate of 10% a day after the due date.
2. Labs more than five days late will receive a zero grade.
3. All labs and assignments (even if receiving a zero grade) must be handed in to receive credit for the course, regardless of overall average.

V. REQUIRED STUDENT RESOURCES:

Environmental Science Study Guide
Environmental Science - Laboratory Sessions, 1995
TEXT: Introductory Plant Biology
Lab coat

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.