Douglas College

Course Information

A: Division: ACADEMIC

DATE: June 4, 1997

B: Department: SCIENCE & TECHNOLOGY

New Course: ___

Revision of Course Information form: X

DATED: June 8, 1990

C:	D:	E:
SCIE 106	INTRODUCTION TO PHYSICAL SCIENCE	5
Subject & Course No.	Descriptive Title	Semester Credit

F: Calendar Description

This course is a basic introduction to physical science, and is intended for students with little or no science background. It will present an integrated approach to topics in physics and chemistry which will include the scientific method, laws of motion, energy, heat and temperature, electricity and magnetism, light, atoms, molecules, chemical reactions, and the atomic nucleus. Laboratory exercises will illustrate the practical applications of course content.

Summary of Revisions:
(Enter date & section)
Ex: Section C,E,F, &R

Section F, N, O, P, Q, R

G: Type of Instruction: Hours Per Week/ Per Semester

Lecture	4 Hrs.
Laboratory	3 Hrs.
Seminar	___ Hrs.
Clinical Experience	___ Hrs.
Field Experience	___ Hrs.
Practicum	___ Hrs.
Shop	___ Hrs.
Studio	___ Hrs.
Student Directed Learning	___ Hrs.
Other	___ Hrs.

TOTAL 7 HOURS

H: Course Prerequisites:
None. MATH 101 or equivalent recommended.

I: Course Corequisites:
None.

J: Course for which this course is a pre-requisite
None

K: Maximum Class Size:
36

M: Transfer Credit:
Requested ___
Granted X
Specify Course Equivalents or Unassigned Credit as Appropriate

U.B.C.
S.F.U. GE(3) Science
U. Vic. ED-E 100 lev (1.5)
OTHER:

L: College Credit Transfer X

College Credit Non-Transfer ___

Course Designer(s)

Vice-President, Instruction

Dean

Registrar

N: Textbooks and materials to be purchased by students
(Use Bibliographic Form):

Faughn, J.S.; Chang, R; Turk, J.; Physical Science, Second Edition, Saunders College Publishing, 1995.

Complete Form with Entries Under the Following Headings:

O. Course Objectives; P. Course Content; Q. Method of Instruction;

R. Course Evaluation

O. General Course Objectives:

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

1. Outline how scientific knowledge is acquired, organized, and retrieved.
2. Make and report scientific measurements using correct significant figures.
3. Draw properly labeled graphs to show the relationship between two variables.
4. Perform unit conversions within the SI system.
5. Solve numerical problems involving motion.
6. Define and/or explain work, energy, force, acceleration, and inertia..
7. Explain and apply the First and Second Laws of Thermodynamics.
8. Solve problems involving heat flow and temperature.
9. Apply Coulomb's Law to calculate the force between two static charges.
10. Explain the operation of an electromagnet, electric motor, and a.c. generator
11. Analyze a given electrical circuit (current, voltage, resistance).
12. Explain the terms " longitudinal, transverse, constructive and destructive interference" as they apply to waves.
13. Describe the properties of radiation in each part of the electromagnetic spectrum.
14. Describe the early experiments which were used to elucidate the structure of the atom.
15. Describe the Periodic Table of the Elements and explain its use.
16. Explain, and draw diagrams to illustrate the difference between ionic and covalent bonds.
17. Describe the three phases of matter, solids, liquids, and gases, with respect to structure and bonding.
18. Given the chemical equation for a reaction, indicate what type of reaction it is, and explain why.
19. Describe the following types of molecules with respect to function, bonding, and structure: proteins, enzymes, carbohydrates, nucleic acids, and lipids.
20. Explain the three types of radioactive decay.
21. Describe how radioactive isotopes may be used to determine the age of materials.
22. Explain the two processes by which energy can be extracted from the nucleus: fission, and fusion.
23. Discuss the relevance of the topics covered in this course to current environmental issues.

P. Course Content

1. **Introduction**

The scientific method, organization of science, describing the physical world, measurements, direct and inverse relationships, graphical analysis, S.I. system of units, scientific notation. Use of computers: searching for information, data analysis. Library searches.

2. **Motion**

Speed and velocity, acceleration, forces and motion, inertia; Newton's Laws of Motion; friction.

3. **Energy and Momentum**

Momentum, conservation laws: momentum and energy; work, kinetic energy, power, simple machines. Gravitation, projectile motion, circular motion.

4. **Heat and Thermodynamics**

Heat and temperature, heat capacity, changes of phase, heat transfer, greenhouse effect. First Law of Thermodynamics, heat engines, Second Law of Thermodynamics and consequences for power generation and thermal pollution.

5. **Mechanical Waves: Sound**

Wave motion, sound waves, speed of sound, interference, standing waves, musical sounds.

6. **The Atom**

Early experiments, fundamental particles, isotopes, Bohr model, modern view of the hydrogen atom, lasers.

7. **Elements and Compounds**

Elements, molecules, compounds and mixtures, states of matter, properties of gases and the gas laws, liquids, solids and liquid crystals.

8. **The Periodic Table and Chemical Bonds**

Electronic structure of atoms, periodic table, metals and non-metals, types of bonding, equations, ionic compounds, covalent compounds, organic chemistry.

9. **Principles and Applications of Chemistry**

The mole, molar mass, acids and bases, oxidation and reduction, batteries, acid rain, the ozone layer, air pollution, soaps and detergents.

10. **Electricity and Magnetism**

Static electricity, Coulomb's Law, electric fields, electric circuits, resistance, Ohm's Law, power. Magnetism, magnetic fields, connection between electricity and magnetism, induction, electric motors and generators.

11. **Properties and Nature of Light**

Speed of light, reflection, mirrors, refraction, lenses, telescopes. Nature of light: wave or particle? diffraction grating, spectral analysis, electromagnetic spectrum, polarized light.

12. **The Nucleus**

Structure of the nucleus, isotopes, radioactivity, radioactive decay, radiometric dating, nuclear fission, fusion, nuclear reactors, environmental issues.

Laboratory Content

The following laboratory experiments will be performed:

1. Measurement of Volume and Density
2. Graphing and Data Analysis
3. Laws of Motion
4. Force
5. Static Electricity
6. Electrical Current
7. Electrical Induction and Motors
8. Heat and Temperature
9. Properties of Light and Spectroscopy
10. The Gas Laws
11. Types of Chemical Reaction
12. Acid-Base Reactions

Q. Method of Instruction

The course will be presented using lectures, problem sessions, small group activities, and practical demonstrations. Films and other audio-visual aids will be used where appropriate. When the nature of the experiment permits, lectures and laboratory experiments will be integrated to allow for discussion and analysis of results. More formal lab sessions will be conducted for those experiments having safety implications. Projects and homework will be assigned to be done individually, or in small groups, and may require the use of the student computer labs.

R. Evaluation

The student's performance in the course will be based on the following evaluations:

1. Tests and Examinations (50%)

Two in-class test will be given during the semester (10% each) and a final comprehensive exam will be written at the end of semester (30%).

2. Laboratory (Maximum 25%)

A report will be required for each laboratory experiment. One complete write-up will be required, the remainder will involve pre-formatted report sheets. Some of these reports will be marked Pass/Fail.

3. Assignments (Maximum 20%)

Problem assignments will be handed out regularly to be done by small groups or individual students.

4. Class Participation (Maximum 5%)

Participation will be evaluated based on attendance, and contribution to class and small-group discussions.