Grande Prairie Regional College
Department: Academic Upgrading

SCIENCE 0100

COURSE OUTLINE

SC 0100 Science and Society 5 (5-0-0) HS Time: 75 Hours

Chemistry, Physics, Astronomy, and Geology:

Instructor	Nancy Fraser	**Phone**	539 – 2980
Office	J – 216	**E-mail**	nfraser@gprc.ab.ca
Office Hours	As posted on my office door.		

Ecology and Genetics:

Instructor	Alan Iwaskow	**Phone**	539 – 2713
Office	C – 207	**E-mail**	aiwaskow@gprc.ab.ca
Office Hours	As posted on my office door.		

Description: This course is meant to increase the pre-high school student's understanding of connections between science, technology and society. You will be introduced to basic ideas about science, technology, biology, chemistry, physics, ecology, scientific method, along with related social issues.

Corequisite(s):: EN 0090 and MA 0090 or consent of instructor.

Delivery Mode(s): Lecture, power point presentations, and videos will be the main method of delivery. There is also a large laboratory component in this course.

Required Text/Resource Materials: A Little Bit of Science by N. Fraser
Lab notebook
Lab manual

Course Content

Chemistry   **Time: 3 weeks**

Unit 1:   Introduction to Chemistry

On completing this section, you should be able to:

i)   Explain the scientific method.
v)   Define density, mass, volume and know the formula that relates them. You should also know the units for each variable.
vi)   Distinguish between mass and weight
vii)   Classify matter as homogeneous matter, heterogeneous matter, compounds, elements, pure substances &/or solutions.
viii)   Define state of matter, and state changes.
ix)   Define and distinguish between physical, and chemical properties, and physical and chemical changes

UNIT 2:   Atomic Structure:

On completing this section, you should be able to:

i)   Define a proton, an electron and a neutron and know where the are found in an atom.
ii)   State the hypotheses Dalton made about the structure of an atom. You should also be able to state the laws of definite proportions and of multiple proportions.

iii)   Define atomic number, atomic mass number.

iv)   Draw the atomic structure diagrams of atoms or ions for the first 20 elements.

Unit 3:   Periodic Table:

On completing this section, you should be able to:

i)   State the chemical symbols for the elements and know the names of the elements. You should also have MEMORIZED the first twenty elements in periodic table format.

ii)   See trends in the periodic table and state the periodic law.

iii)   Draw the electron dot diagrams of atoms for the first 20 elements.

iv)   Define and distinguish between groups and periods.

v)   Define, distinguish and state characteristics of metals, nonmetal, and metalloids and be able to find them on the periodic table.

Unit 4:   Inorganic Nomenclature:

On completing this section, you should be able to:

i)   Single valence metals

ii)   Two nonmetals

Computer assignment: There is a website called "FREE RICE". The website sponsors send the rice you earn to needy people around the world. One of the subject that you can practice on this site is nomenclature. Choose the **BASIC CHEMISTRY** subject. While you are practising nomenclature you can earn rice for other people. You may use a periodic table. Each day when you are finished print your last page and give it to Natasha. She will keep them and when you have donated **10000** gains of rice bring them to me and I will give you 5% for the chemistry component.

Physics   **Time:2 weeks**

Unit 1:   Introduction:

On completing this section, you should be able to:

i)   Define physics
ii)   Become familiar with several instrument for measuring length.

Unit 2:   Kinematics:(As time permits.)

On completing this section, you should be able to:

i)   Solve problems related to distance, speed, and time.

Unit 3:   Light: (As time permits.)

On completing this section, you should be able to:

i)   Describe the nature of light.
ii)   State the law of reflection, and draw and label related diagrams.
iii)   Explain refraction of light, and draw and label related diagrams.
iv)   Describe how holograms are made. (If time permits)

Astronomy   **Time: 2 weeks**

Unit 1:   Introduction to Astronomy

On completing this section, you should be able to:

i)   Define astronomy
ii)   Define universe, galaxy, star, comets, meteor, meteoroid and meteorite.

Unit 2:   Our Solar System

On completing this section, you should be able to:

i)   Label the layers of the sun on a diagram.

ii)   State Ptolemy's model of the solar system. (Geocentric Model)

iii)   State the refinements that Copernicus made to Ptolemy's model. (Heliocentric Model)

iv)   State Galileo's contributions to astronomy.

v)   State Kepler's three laws of planetary motion.

vi)   State the refinements that Kepler made to Copernicus' model.

vii)   State the order of the planets starting from the sun.

Unit 3:   The Moon

On completing this section, you should be able to:

i)   Name phases of the moon.

ii)   Explain how tides are formed.

Unit 4:   Whatever topic(s) interest students.

Expectations depend on topics selected by students.

i)   Discuss fun stuff such as – blockholes, supernovae, red giants, reading star charts.

Geology   Time: 2 weeks

Unit 1:   Introduction to Geology

On completing this section, you should be able to:

i)   Define geology.

Unit 2:   Rock and minerals

On completing this section, you should be able to:

i)   Define the terms rock, and minerals.
ii)   Define igneous, metamorphic, and sedimentary rocks are describe how they are formed.
iii)   Distinguish between magma and lava.
iv)   Give an example of each type of rock.
v)   Draw the rock cycle.
vi)   Define weathering, and erosion.

Unit 3:   Structure of the Earth

On completing this section, you should be able to:

i)   Label layers of the Earth and the atmosphere.
ii)   Define plate tectonics.
iii)   Define earthquake and state why they occur.
iv)   Discuss volcanoes and state how they are formed.

SC0100 Biology   Time: 4 weeks

Part 1-Ecology

On completing this section, a student shall be able to:

i)   Define ecology
ii)   List the basic needs of all living things.
iii)   Define the terms species, population and community.
iv)   Define and give examples of biotic and abiotic factors.
v)   Define the term ecosystem
vi)   Describe various interactions between biotic and abiotic factors in an ecosystem.
vii)   Define the term adaptation.
viii)   Give examples of animals and plants that have specific structural or behavioral adaptions to survive in their environments.

ix)   Define the term variation and give examples of variation with in species, and among species.

x)   Differentiate between discrete and continuous variations.

xi)   Discuss the importance of species variation during changing environmental conditions xii) (resistance to disease, ability to survive extreme environments)

xiii)   Define the term niche.

xiv)   Describe how niche variations allow closely related species to survive in the same environment.

xv)   Describe the term symbiotic relationships.

xvi)   Define the terms mutualism, parasitism, and commensalism.

xvii)   Given and relationship, be able to identify the type.

xviii) Differentiate between and provide examples of producers consumers, and decomposers

xix)   Define primary, secondary and tertiary consumers.

xx)   Differentiate between decomposers and scavengers

xxi)   Define food chains and analyze food chains to identify producers, various consumers, and decomposers

xxii)   Define pyramid of numbers and relate it to the 10% rule of energy flow in a food chain.

xxiii) Define food webs and predict the change in an ecosystem as a result of the loss of a component of the food web.

xxiv)   Describe the movement of pollution in the food chain explaining bioaccumulation

xxv)   Define primary and secondary succession

xxvi)   Identify the effects of human impact such as urban sprawl, introduced species, pesticides, and habitat destruction on an ecosystem.

xxvii) Define indicator species

xxviii) Identifying methods of ecosystem monitoring

xxix)   Define and give examples of threatened, endangered, extirpated and extinct species and state some reasons for their occurrence.

xxx)   illustrate and explain the essential of plants within the environment.

xxxi)   describe uses of plants as sources of food and raw materials, and give examples of other uses (uses of plants as herbs or medicines)

Part 2 - Introduction to Genetics

On completing this section, a student shall be able to:

i)   Compare, in general terms, mitosis and meiosis.

ii)   Define asexual reproduction and list the types (fission, budding, spores, runners, tubers…) and representative species

iii)   Define sexual reproduction and compare it to asexual reproduction

iv)   Explain sexual reproduction in animals using the terms gametes, chromosomes, fertilization, zygote, and embryo.

v)   Compare sexual reproduction in animals to sexual reproduction in plants as previously discussed.

vi)   Discuss alternation of generations in plants

vii)   Define natural selection and describe its role in the evolution

viii)   Define artificial selection

ix)   Discuss some biotechnologies and their implications: genetic engineering, genetically modified organisms, cloning, monocultures, resource management/sustainability (chemical and biological controls, use of fertilizers, plants for food and fibre)

Grading Criteria: Regular attendance is expected of all students, and is crucial to passing this course. Students who miss classes will soon find themselves falling behind and failing. Lateness will **not** be tolerated as it interrupts the instructor and fellow classmates.

As per Department Policy, if you miss more than 10 per semester of classes in any course, you may be debarred from the final exam for that course.

A certificate (a doctor's or a note from the funeral home) will be required to make up the midterm or final exam. Call if you are going to miss a test. There may be a deduction of 10% for test rewrites.

There will be a major chapter tests test the Friday after the conclusion of each section. Student failing to write ALL of the chapter tests will receive a grade of F in the course. The major test on the last unit will be during the final exam period. This date and time will be set by the registrar's office.

***Very important:**   **Laboratory attendance to each specific experiment is compulsory; a passing grade in the laboratory component is required to pass the course.** There are **NO** 'make up' labs in this course. Being absent from an experiment will result in a grade of **ZERO** for that experiment.

Marking Scheme:

Chemistry and Physics:

Assignments:	15%
Labs:	15%
Quizzes:	5%
Free Rice:	5%
Chapter Tests:	60%
	100%

Biology:

Assignments:	25%
Homework:	5%
Labs:	10%
Unit Exams:	35%
Final Exams:	25%
	100%

The Final grade will be determined based on 66% of chemistry and physics grades and 34% of the Biology grade.

STUDENT RESPONSIBILITIES:

Students will:

– be at class regularly and on time. (If you miss more than 10 per semester of classes in any course, you may be debarred from the final exam for that course.)
– complete all pre class and pre-lab assignments before arriving in class.
– keep up with course material.
– if experiencing difficulties with course material get help immediately.
– catch up on missed material before the next class. Get a phone number from someone in the class so you can keep up.
– provide documentation for missed midterms or finals.
– be aware of penalty for failing the lab component and not writing the final.

STATEMENT ON PLAGIARISM AND CHEATING:

Please refer to pages 49-50 of the College calendar regarding plagiarism, cheating and the resultant penalties. These are serious issues and will be dealt with severely.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Designation
A$^+$	4	90 – 100	EXCELLENT
A	4	85 – 89	
A$^-$	3.7	80 – 84	FIRST CLASS STANDING
B$^+$	3.3	77 – 79	
B	3	73 – 76	GOOD
B$^-$	2.7	70 – 72	
C$^+$	2.3	67 – 69	SATISFACTORY
C	2	63 – 66	
C$^-$	1.7	60 – 62	
D$^+$	1.3	55 – 59	MINIMAL PASS
D	1	50 – 54	
F	0	0 – 49	FAIL