



DEPARTMENT OF ACADEMIC UPGRADING

COURSE OUTLINE – Fall 2018

**SC0100 (A2): Science and Society – 5 (5-0-0) 75 Hours
for 15 Weeks**

INSTRUCTOR: Nicoletta Harabor **PHONE:** 780-539-2794
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OFFICE HOURS: Wednesdays and Thursdays 10:00 to 11:20 am and Fridays 10:00 to 10:50
am in Room B302

CALENDAR 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.

PREREQUISITES/COREQUISITES(s): EN 0080 and MA 0081 or MA 0091 placement.

REQUIRED TEXT/RESOURCE MATERIAL: A Little Bit of Science by N. Fraser
Lab notebook

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.

COURSE OBJECTIVES:

The following are the topics that we be covering in this course are:

1. introduction to science and discuss the scientific method.
2. introduce and define chemistry.
3. terminology related to chemistry.
4. scientific notation.
5. how to set up and solve chemistry problems.
6. build an atom.
7. two methods on nomenclature
8. the proper way to conduct oneself in a laboratory situation.
9. how to write up a formal lab report.
10. physical sciences including physics, geology, and astronomy.
11. formula relating displacement, constant velocity, and time and solving related problems.
12. definition of and distinguish between transverse and longitudinal waves.
13. parts of a wave.
14. the universal wave equation.
15. light.
16. reflection and refraction of waves.
17. spectroscopy.
18. how emission and absorption spectra can be used to identify substances.
19. several models of the solar system.
20. names of the planets in our solar system starting from the Sun.
21. meteoroids, meteors, meteorites and distinguish among them.
22. comets.
23. constellations and some bright stars.
24. how to read star charts and find some bright stars.
25. geology.
26. define and discuss plate tectonics, earthquake, and volcanoes.
27. explain characteristics of the three types of rocks and the rock cycle.
28. seasons.
29. phases of the moon, and tides.
30. definition of ecology
31. basic requirements of living things.
32. species, population, and community.
33. biotic and abiotic factors as well as interactions between them in an ecosystem.
34. ecosystems.
35. adaptation.

36. specific structural or behavioural adaptations required for animals and plants to survive in their environment.
37. variation, variation within a species and among species.

LEARNING OUTCOMES:

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 they 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 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.

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 and 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 adaptations to survive in their environments.
- ix) Define the term variation and give examples of variation within species, and among species.
- x) Differentiate between discrete and continuous variations.
- xi) Discuss the importance of species variation during changing environmental conditions (resistance to disease, ability to survive extreme environments)
- xii) Discuss the importance of variation to adaptation
- 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 an organism and its 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) Discuss the uses of plants for food, fibers and medicine.

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 the following inheritance terms: traits, alleles, dominant, recessive, homozygous, heterozygous, genotype, phenotype, artificial and natural selection.
- ix) Construct and interpret a Punnett square
Discuss some biotechnologies and their implications: genetic engineering, genetically modified organisms, cloning, monocultures, resource management/sustainability (chemical and biological controls, use of fertilizers,)

TRANSFERABILITY: ***Warning:** Although we strive to make the transferability information in this document up-to-date and accurate, **the student has the final responsibility for ensuring the transferability of this course to Alberta Colleges and Universities.** Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at Alberta Transfer Guide main page <http://www.transferalberta.ca> or, if you do not want to navigate through few links, at <http://alis.alberta.ca/ps/tsp/ta/tbi/onlineSearch.html?SearchMode=S&step=2>

** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. **Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

Evaluations:

Chemistry and Physics:

Assignments:	15%
Labs:	15%
Quizzes:	5%
Free Rice:	5%
Chapter Tests:	<u>60%</u>
	100%

Biology:

Assignments and quizzes:	40%
Labs:	15%
Unit Exams:	<u>45%</u>
	100%

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

GRADING CRITERIA: Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines		Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100		C+	2.3	67-69
A	4.0	85-89		C	2.0	63-66
A-	3.7	80-84		C-	1.7	60-62
B+	3.3	77-79		D+	1.3	55-59
B	3.0	73-76		D	1.0	50-54
B-	2.7	70-72		F	0.0	00-49

*****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.

COURSE SCHEDULE/TENTATIVE TIMELINE: There will be a major chapter test the Friday after the conclusion of each section. Students 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.

STUDENT RESPONSIBILITIES:

Refer to the College Policy on Student Rights and Responsibilities at www.gprc.ab.ca/d/STUDENTRIGHTSRESPONSIBILITIES

If you are late for a lab, you might not be permitted to do the lab as important safety concerns are always addressed at the beginning of each lab period. If you miss a lab, you will not have the opportunity for a make-up lab. You automatically receive a grade of 0 for that lab.

Attendance: If you miss 10 or more classes (including labs) you may be debarred from the final exam.

Lateness: Lateness will not be tolerated.

Cell Phone Use: Turn them off during class time.

Labs and assignments: These are due on the day announced in class, lab or as posted on Moodle. If you submit your assignment or lab late you may be docked 10% per day late. **A late assignment or lab will not be accepted once the assignment or lab has been returned to other students.**

Tests and Exams: Use of any electronic communication devices during Tests and Exams is not permitted.

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the College Admission Guide at <http://www.gprc.ab.ca/programs/calendar/> or the College Policy on Student Misconduct: Plagiarism and Cheating at <http://www.gprc.ab.ca/about/administration/policies/>