DEPARTMENT OF ACADEMIC UPGRADING
COURSE OUTLINE
SC0110 - Science Grade 10 Equivalent 5 (6-0-1.5) HS
(7.5 Hours/week for 15 weeks)

INSTRUCTOR:	NANCY FRASER	**PHONE:**	539 – 2980
OFFICE:	J – 216	**E-MAIL:**	Nfraser@gprc.ab.ca
OFFICE HOURS:	AS POSTED ON MY OFFICE DOOR		

INSTRUCTOR:	NICOLETTA HARABOR	**PHONE:**	539 – 2945
OFFICE:	J – 222	**E-MAIL:**	Nharabor@gprc.ab.ca
OFFICE HOURS:	AS POSTED ON MY OFFICE DOOR		

Required Text/Resource Materials:

Never Ending Nomenclature by Nancy Fraser
Lab manual
Lab coat
10 quad to 1 cm graph paper
Nonprogrammable calculator
Lab notebook

CALENDAR DESCRIPTION: This course provides an introduction to major concepts in biology, chemistry and physics. The four areas of study are: Energy and Matter in Chemical Change, Energy Flow in Technological Systems, Cycling of Matter in Living Systems and Energy Flow in Global Systems.

PERQUISITES : SC0100 or consent of the department; EN0090 or EN0110 placement; MA0091 or MA0093 or MA0110 placement

CHEMISTRY

OBJECTIVES:

This unit will introduce students to the following key concepts of:

– state the number significant figures and how to correctly round numbers.
– write numbers in scientific notation and in standard form.
– define density and solve related problems.

Unit 2: Atomic Structure:

This unit will introduce students to the following key concepts of:

– Chemistry terminology
– Atomic mass, atomic mass units, and isotopes
– Elementary atomic structure and atomic structure diagrams for the first 20 elements

Unit 3: Inorganic Nomenclature: (THE MOST IMPORTANT PART OF CHEMISTRY!!!)

This unit will introduce students to the following key concepts of:

– Nomenclature: six categories of naming inorganic compounds

Unit 4: Chemical Equations:

This unit will introduce students to the following key concepts of:

– state law of conservation of mass
– balancing equations by inspection

OUTCOMES: **Course Content**

CHEMISTRY Time: 22 days

Unit 1: Introduction: **Approximately 3 days**

On completing this section, you should be able to:

- state SI units and know how to convert various units
- state the number significant figures and how to correctly round numbers.
- write numbers in scientific notation and in standard form.
- define density and solve related problems.
- define WHMIS and know the related symbols and the appropriate safety measures that need to do taken.

Unit 2: Atomic Structure: **Approximately 3 days**

On completing this section, you should be able to:

- define atomic number (Z)
- define atomic mass number
- define atomic mass units
- define isotopes
- draw atomic structure diagrams
- write out the names and symbols of the first 20 elements in the same position as they appear on the periodic table from memory
- state the octet rule (Rule of eight).
- state the number of valence electrons, and draw the electron dot diagrams for all elements of the "main part" of the periodic table.
- Groups and periods
- Metals, nonmetals, & metalloids(semi-metals)

Unit 3: Inorganic Nomenclature: **Approximately 7 days**

(THE MOST IMPORTANT PART OF CHEMISTRY!!!)

On completing this section, you should be able to name and write formulae in each of the following seven categories:

- Single valence metals
- Two nonmetals
- Variable valence metals

- Polyatomic ions
- Binary acids
- Ternary or oxyacids
- Bases
- Students should be able to state the Arrhenius definition of an acid and a base.

Unit 4: Chemical Equations: **Approximately 3 days**

On completing this section, you should be able to:

- state law of conservation of mass
- balancing equations by inspection

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 practicing 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: 22 days

Objectives:

Unit 1: Kinematics

This unit will introduce students to the following key concepts of:

– Kinematics from a formulae and graphical perspective

Unit 2: Force and Newton's Laws of Motion Approximately 2 days

This unit will introduce students to the following key concepts of:

– Newton's three laws of motion

Unit 3: Work, Energy, and Power — Approximately 5 days

This unit will introduce students to the following key concepts of:

– Work, power, kinetic, potential and conservation of energy
– Simple machines and efficiency

Unit 4: Heat — Approximately 4 days

This unit will introduce students to the following key concepts:

– First law of thermodynamics
– Heat transfer
– Latent heat

Outcomes:

Unit 1: Kinematics — Approximately 5 days

On completing this unit, you should be able to:

- Define and distinguish between distance and displacement giving examples.
- Define and identify scalar and vector quantities, giving examples.
- Define and explain speed and velocity; average and instantaneous. State their units.
- Define and explain acceleration and state its units.
- Explain why time appears twice in the acceleration unit.
- Draw distance-time, and velocity-time graphs. Determine velocity and acceleration from the slopes of the respective graph. Determine displacement from the area under a velocity-time graph.
- Apply the following formulas in relevant situations to solve problems.

$$v = \frac{x}{t}; \qquad v = \frac{v + v_0}{2}; \qquad v = v_0 + at;$$

$$x = \left(\frac{v + v_0}{2}\right)t \qquad x = v_0 t + \tfrac{1}{2}at^2; \qquad v^2 = v_o^2 + 2ax$$

- Use the international sign conventions for positive and negative directions
- Define acceleration due to gravity, “g” and state its value. Also be able to explain the dependency of the value of “g”on different locations.
- Distinguish between mass and weight, and state their units.
- Solve problems involving “g.”

Unit 2: Force and Newton's Laws of Motion Approximately 2 days

On completing this unit, you should be able to:

- Define and explain force, and state its units
- State and explain Newton's First Law of Motion giving examples. Explain inertia and its relation to the First Law.
- State and explain Newton's Second Law of Motion and derive the expression F = ma.
- Explain the force of friction, and incorporate it in problems involving force.
- Solve problems based on the Second Law.
- State and explain Newton's Third Law of Motion, and apply it to relevant situations.

Unit 3: Work, Energy, and Power Approximately 5 days

On completing this unit, you should be able to:

- Define and explain energy and state its units.
- Name different forms of energy, and explain the principle of conservation of energy.
- Explain kinetic and potential energies, and using the principles of conservation of energy, convert kinetic energy into potential energy, and vice-versa.
- Define and explain work done by a force, and state units of work.
- Identify situations in which a force does not do any work.
- Calculate work done in different situations.
- Explain the relation between work and energy, and using the relation, convert one into the other. Solve related problems.
- Define and explain power, and state its units. Solve related problems.
- Explain the working of a simple machines; the pulley, the wheel and axle and lever. Explain mechanical advantage and efficiency of simple machines, and how they are calculated.
- Solve problems based on the above three simple machines.

Unit 4: Heat Approximately 4 days

On completing this unit, you should be able to:

- Describe heat as thermal energy, and state its units.
- Define temperature, and distinguish between heat and temperature.
- Explain the Celsius and Kelvin (Absolute) scales of temperature, and convert one into the other.
- Define and explain specific heat capacity (or heat capacity) , and state its units.

- Discuss the implications of the high heat capacity of water, and how it modifies the climate of coastal areas.
- State the relation between the mass of a substance and its heat capacity, amount of heat and temperature change. Solve related problems.
- Define change of state, define and explain heat of fusion and heat of vaporization. State their units.
- Use the heat of fusion and heat of vaporization to calculate the amount of heat absorbed or released when substances undergo phase changes.

Biology

Objectives:

This unit introduces students to the following Key Concepts:

– Microscopy and the emergence of cell theory
– Cellular structures and functions, and technological applications
– Active and passive transport of matter
– Relationship between cell size and shape, and surface area to volume ratio
– Use of explanatory and visual models in science
– Cell specialization in multicellular organisms; i.e., plants
– Mechanisms of transport, gas exchange, and environmental response in multicellular organisms; i.e., plants

Learning Outcomes:

As a result of taking this unit, students will gain the ability to:

BIOLOGY: MICROSCOPY & CELLS

Part 1: Microscopy Approximately: 5 DAYS

- State the contributions of Hans and Zacharias Janssen, Robert Hooke, and Anthony van Leeuwenhoek to the development of early microscopes.
- Identify and name different parts of a compound microscope.
- Outline the procedures of using a microscope.
- List the safety procedures one must follow when using a microscope.
- Differentiate between different types of biological slides such as wet mount slides and prepared slides.
- Describe staining and image enhancing (contrast).

- Determine the magnification of a compound microscope when using the different objectives.
- Define field of view and state what happens to the field of view as different objectives are used.
- Differentiate between drawing magnification and microscopic magnification.
- Calculate drawing magnification and estimate sizes of biological specimens including both macroscopic and microscopic specimens.
- Draw and label lab drawings using biological standards. Define resolving power (or resolution) and relate to the clarity of magnification.
- Summarize the functions of each of the following different types of microscopes: electron microscope, transmission electron microscope (TEM) and scanning electron microscope (SEM). Compare these microscopes to the compound microscope.

Learning Activities:

- Lab #1 – Introduction to Microscopes and Drawings
- Assignment #1 – Microscopy

Internet Resources:

How to Use a Compound Microscope
http://www.udel.edu/biology/ketcham/microscope/scope.html

PowerPoint Presentations
Unit 1 PowerPoint
Compound Microscope PowerPoint

In Class Worksheets
Diagram of Compound microscope (label)
Matching Exercise
Drawing Magnification Exercise

Part 2 – Cell Theory and Cells Approximately: 5 DAYS

- List the 5 general characteristics of living things.
- Define spontaneous generation.
- Summarize the experiments of Redi, Needham, Spallanzani, and Pasteur in terms of spontaneous generation.
- Define controlled variable, manipulated variable, and responding variable, experimental control and discuss in terms of Pasteur's experiment.

- Summarize the contributions of Hooke, Schleiden, Schwann, and Virchow to the development of the cell theory.
- State the modern cell theory.
- Recognize the existence of sub-cellular particles such as viruses and prions, which have only some of the characteristics of living things.
- Describe the structure and function of each of the following organelles: nucleus (nuclear envelope, pores, nucleoplasm, nucleolus, chromatin);cell membrane, vacuole, lysosomes, rough and smooth endoplasmic reticulum, Golgi apparatus, vesicles, ribosomes, chloroplasts, mitochondria, centrioles, cell wall, cytoskeleton, cilia, and flagella.
- Relate a cell's structure to its function.
- Differentiate between prokaryotic and eukaryotic cells.
- Differentiate between animal and plant cells in terms of structure and function.
- Label diagrams of plant and animal cells.

Learning Activities:
Quiz (to be counted as an assignment mark)
Unit 1 Test

Internet Resources:
Tour of the Cell (14 minutes includes a microscope discussion)
https://www.youtube.com/watch?v=1Z9pqST72is&list=TL5kmKsjkw103nc1jdDEi85HH1LVUCdSUZ

Cell Rap Song:
http://www.bing.com/videos/search?q=You+tube+and+Organelle+song&docid=4576280309795566&mid=5031B830BAFCA41C2A365031B830BAFCA41C2A36&view=detail&FORM=VIRE1#view=detail&mid=EEA648DCDF16FEE10F4CEEA648DCDF16FEE10F4C

Cells Alive
Interactive Labelling Exercise
http://cellsalive.com/cells/cell_model.htm

Cell Quiz: Test Yourself
http://www.wisc-online.com/objects/typical_animal_cell/

TRANSFERABILITY: ** 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.

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.

There will be a final exam at the end of each subject area. A certificate (a doctor's or a note from the funeral home) will be required to make up a final exam. ****You will receive a grade of F if you miss a final.**** Call if you are going to miss a test. There maybe a deduction of 10% for test rewrites.

There are **NO** 'make up' labs in this course. Being absent from an experiment will result in a grade of **ZERO** for that experiment.

Lab reports must be submitted on the required date and by the required time. ****If you fail the lab component of the course you will receive a grade of F.****

Assignments may not be accepted after the assignment has been returned to the class. I am usually a speedy marker and usually return papers the next day.

Penalties for late **assignments** are as follows: (Assuming that I have not returned the marked assignments)

1 day late – 20%, 2 days late – 50%, 3 days late –100%

Penalties for late **lab reports** are as follows:

5 minutes after due time –10 %, 24 hours after due time –100%

The Final exam is set by the Student Services. It will be composed of material from the course.

Marking Scheme:

Chemistry & Physics:	Lab Reports:	10%
	Assignments:	10%
	Free rice:	5%
	Quizzes:	5%
	Tests:	10%
	Final exams:	60%
	Total	100%
Biology:	Assignment	20%
	Quizzes	15%
	Labs	15%
	Final exams	50%
		100%

******** **Students that receive a grade of less than 50% on of this course or receive a grade of less than 40% in one subject area will receive a grade of F. ******

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

GRANDE PRAIRIE REGIONAL COLLEGE			
GRADING CONVERSION CHART			
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
WF	0	0	FAIL, withdrawal after the deadline

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 get help immediately.
– catch up on missed material before the next class.
– 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:

Refer to the College Policy on Student Misconduct: Plagiarism and Cheating at www.gprc.ab.ca/about/administration/policies/fetch.php?ID=69

**Note: all Academic and Administrative policies are available at https://www.gprc.ab.ca/about/administration/policies/
(Scroll down to Students Rights and Responsibilities)