



**DEPARTMENT OF ACADEMIC UPGRADING
COURSE OUTLINE FALL 2014
SCIENCE 0110**

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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

CREDIT/CONTACT HOURS: SC0110 is 5 hours per week. (6-0-1.5)

OBJECTIVES:**Course Content****CHEMISTRY****Time: 22 days****Unit 1: Introduction:****Approximately 3 days**

On completing this section, you should be able to:

- i. state SI units and know how to convert various units
- ii. state the number significant figures and how to correctly round numbers.
- iii. write numbers in scientific notation and in standard form.
- iv. define density and solve related problems.
- v. 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:

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

Unit 5: 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:

- i. Single valence metals
- ii. Two nonmetals
- iii. Variable valence metals

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

Unit 6: Chemical Equations:

Approximately 3 days

On completing this section, you should be able to:

- i. state law of conservation of mass
- ii. 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 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: 22 days

Unit 1: Kinematics

Approximately 5 days

On completing this unit, you should be able to:

- i. Define and distinguish between distance and displacement giving examples.
- ii. Define and identify scalar and vector quantities, giving examples.
- iii. Define and explain speed and velocity; average and instantaneous. State their units.
- iv. Define and explain acceleration and state its units.
- v. Explain why time appears twice in the acceleration unit.
- vi. 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.
- vii. Apply the following formulas in relevant situations to solve problems.

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

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

- viii. Use the international sign conventions for positive and negative directions
- ix. 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.
- x. Distinguish between mass and weight, and state their units.
- xi. 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:

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

Unit 3: Work, Energy, and Power

Approximately 5 days

On completing this unit, you should be able to:

- i. Define and explain energy and state its units.
- ii. Name different forms of energy, and explain the principle of conservation of energy.
- iii. Explain kinetic and potential energies, and using the principles of conservation of energy, convert kinetic energy into potential energy, and vice-versa.
- iv. Define and explain work done by a force, and state units of work.
- v. Identify situations in which a force does not do any work.
- vi. Calculate work done in different situations.
- vii. Explain the relation between work and energy, and using the relation, convert one into the other. Solve related problems.

- viii. Define and explain power, and state its units. Solve related problems.
- ix. 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.
- x. Solve problems based on the above three simple machines.

Unit 4: Heat

Approximately 4 days

On completing this unit, you should be able to:

- i. Describe heat as thermal energy, and state its units.
- ii. Define temperature, and distinguish between heat and temperature.
- iii. Explain the Celsius and Kelvin (Absolute) scales of temperature, and convert one into the other.
- iv. Define and explain specific heat capacity (or heat capacity) , and state its units.
- v. Discuss the implications of the high heat capacity of water, and how it modifies the climate of coastal areas.
- vi. State the relation between the mass of a substance and its heat capacity, amount of heat and temperature change. Solve related problems.
- vii. Define change of state, define and explain heat of fusion and heat of vaporization. State their units.
- viii. Use the heat of fusion and heat of vaporization to calculate the amount of heat absorbed or released when substances undergo phase changes.

Biology

Time: 22 days

By the end of this section, students should be able to:

- i) Explain the relationship between developments in imaging technology and the current understanding of the cell
 - trace the development of the cell theory: all living things are made up of one or more cells and the materials produced by these, cells are functional units of life, and all cells come from pre-existing cells
 - describe how advancements in knowledge of cell structure and function have been enhanced and are increasing as a direct result of developments in microscope technology and staining techniques
 - identify areas of cell research at the molecular level

- ii) Describe the function of cell organelles and structures in a cell, in terms of life processes, and use models to explain these processes and their applications
- compare passive transport of matter by diffusion and osmosis with active transport in terms of the particle model of matter, concentration gradients, equilibrium and protein carrier molecules
 - use models to explain and visualize complex processes like diffusion and osmosis, endo- and exocytosis, and the role of cell membrane in these processes
 - describe the cell as a functioning open system that acquires nutrients, excretes waste, and exchanges matter and energy
 - identify the structure and describe, in general terms, the function of the cell membrane, nucleus, lysosome, vacuole, mitochondrion, endoplasmic reticulum, Golgi apparatus, ribosomes, chloroplast and cell wall, where present, of plant and animal cells
 - compare the structure, chemical composition and function of plant and animal cells, and describe the complementary nature of the structure and function of plant and animal cells
 - describe the role of the cell membrane in maintaining equilibrium while exchanging matter
 - describe how knowledge about semi-permeable membranes, diffusion and osmosis is applied in various contexts
 - describe cell size and shape as they relate to surface area to volume ratio, and explain how that ratio limits cell size
- iii) Analyze plants as an example of a multicellular organism with specialized structures at the cellular, tissue and system levels
- explain why, when a single-celled organism or colony of single-celled organisms reaches a certain size, it requires a multicellular level of organization, and relate this to the specialization of cells, tissues and systems in plants
 - describe how the cells of the leaf system have a variety of specialized structures and functions
 - explain and investigate the transport system in plants
 - explain and investigate the gas exchange system in plants
 - explain and investigate phototropism and gravitropism as examples of control systems in plants
 - trace the development of theories of phototropism and gravitropism

- iv) Conduct investigations into relationships between and among observable variables, and use a broad range of tools and techniques to gather and record data and information
- carry out procedures, controlling the major variables and adapting or extending procedures
 - use instruments effectively and accurately for collecting data (e.g., use a microscope to observe movement of water in plants; prepare wet mounts of tissue from flowering plants, and observe cellular structures specific to plant and animal cells; stain cells to make them visible)
 - estimate quantities (e.g., compare sizes of various types of cells under the microscope; calculate magnification, field of view and scale)
 - compile and organize data, using appropriate formats and data treatments to facilitate interpretation of the data
 - use library and electronic research tools to collect information on a given topic
 - select and integrate information from various print and electronic sources or from several parts of the same source

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.

A certificate (a doctor's or a note from the funeral home) will be required to make up the midterm or final exam. **You will receive a grade of F if you miss the 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.

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%
	Unit Tests:	<u>60%</u>
	Total	100%

Biology:	Assignment	20%
	Quizzes	15%
	Labs	15%
	Unit Test	<u>50%</u>
		100%

Physics:	Lab Reports:	10%
	Assignments:	10%
	Tests:	20%
	Unit Test:	<u>60%</u>
		100%

****** Student 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 https://www.gprc.ab.ca/files/forms_documents/Student_Misconduct.pdf

**Note: all Academic and Administrative policies are available at <https://www.gprc.ab.ca/about/administration/policies/>