

SC 0100

COURSE OUTLINE

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TEXT BOOK: No recommended text book. Tests and exams will be based on class notes.

COURSE DELIVERY: It is basically a lecture course with a great emphasis on in-class discussion. 10% of the final grade will be based on attendance and participation. Students with more than 10% unexcused absences will receive a zero mark for participation.

OBJECTIVES OF THE COURSE: To provide a learning environment for the students to gain enough knowledge so that they develop appreciation for science, and are prepared to enroll in any of the science courses at 0110 level offered by the Department.

ATTENDANCE AND LATENESS: Regular attendance is expected of all students as it is crucial to passing the course especially because there is no recommended text book. Students missing more than 25% of lectures may be required to withdraw from the course, and/or may be given a failing grade. Lateness will not be permitted as it disrupts the class.

TESTS AND EXAMS: All tests and exams **MUST** be written at the schedule times unless **PRIOR** arrangements have been made with the instructor(s). A **missed test or exam will result in a mark of zero for that test/exam.**

COURSE ORGANIZATION: The course has been divided into two main parts . A and B. Part A consists of scientific method, basic chemistry, and basic physics. Part B consists of ecology and biology. Each part is further divided into two units. We will spend about 7.5 weeks on part A and about 5.5 weeks on part B.

COURSE EVALUATION: The final grade will be based on the following components as per the scheme below.

Test unit 1. (Scientific method and chemistry)	= 28%
Test unit 2. (Physics)	= 22%
Test unit 3. (Ecology)	= 20%
Test unit 4. (Biology)	= 20%
Attendance and participation.	= 10%
Total	= 100%

COURSE OBJECTIVES

The following is the minimum list of objectives which must be achieved by the student over the semester. More objectives may be added later if time permits.

PART A

UNIT 1: SCIENTIFIC METHOD and CHEMISTRY

On completing this unit you should be able to

- (a) Define science giving examples, and be able to list its major branches
- (b) Explain scientific method (how science develops), and be able to define and distinguish between hypothesis, theory and law
- (c) Explain technology, and the relationship between science and technology. Given a process, be able to identify whether it is a technological application or not
- (d) Define chemistry and list its various branches
- (e) Define, and classify matter into various categories
- (f) Define elements, compounds and mixtures, and be able to classify a given substance into one of the above categories
- (g) Give the symbols of the most common elements
- (h) Identify whether a given symbol (or a formula) represents an element or a compound
- (i) Identify an element if its symbol is given
- (j) Write formulas for simple inorganic compounds, and be able to identify the compound if its formula is given
- (k) Define atoms and molecules
- (l) Define the three fundamental particles (electrons, protons, and neutrons) which

- make up atoms giving their relative masses and charges
- (m) Define atomic and mass numbers. Be able to determine the number of electrons, protons, neutrons, atomic number and mass number of an element if enough information is provided
 - (n) Define isotopes. Given the number of electrons (or protons) and the neutrons in two or more elements, be able to identify if there are any isotopes in the list.
 - (n) Define solutions, and distinguish between homogeneous and heterogeneous solutions
 - (o) Give examples of solutions in which any of the three states of matter .solid, liquid and gas functions as the solvent and the other two as the solutes. Identify the solvent and the solute in a given solution
 - (p) List the factors that affect the solubility of a solid in a liquid
 - (q) Define saturated and unsaturated solutions, and discuss how a saturated solution can be converted into an unsaturated solution and vice versa
 - (r) Define density of a substance, and solve problems involving density
 - (s) Define a chemical equation, and identify reactants and products
 - (t) Define physical and chemical properties giving examples. Given a property, be able to classify it as physical or chemical
 - (u) Define physical and chemical changes giving examples. Given a change, be able to classify it as physical or chemical

WRITE UNIT I TEST

UNIT 2. PHYSICS

On completing this unit the student should be able to

- (a) Define significant digits (S.D.), and identify the number of S.D. in a given number
- (b) Round off numbers to the desired number of S.D., and express the result in scientific notation.
- (c) Explain the rules of reporting results to the appropriate number of S.D. during simple mathematical operations, and be able to apply those rules when solving simple mathematical calculations
- (d) Distinguish between fundamental and derived units, and be able to identify a given unit as fundamental or derived
- (e) Define scalar and vector quantities giving examples, and be able to identify a given quantity as being scalar or vector
- (f) Given two sides of a right triangle, be able to calculate the third
- (g) Define and explain the following quantities giving examples: distance,

- displacement, speed, velocity, average and instantaneous speed, and average and instantaneous velocity
- (h) Give the units of each of the above quantities; and given units be able to identify the quantity which the units represent
 - (i) Solve simple problems relating the above quantities
 - (j) Define acceleration and deceleration, and give their units
 - (k) Solve simple related problems

WRITE UNIT 2 TEST

PART B

UNIT 3: Ecology and Ecosystems

- (a) Define ecology and discuss how organisms are adapted to their environments.
- (b) Define ecosystem, list abiotic and biotic components and their interactions and interdependence.
- (c) Outline trophic levels , define and give examples of autotrophs and heterotrophs, ecological food chains, food webs and ecological pyramids.
- (d) Develop a basic understanding of photosynthesis and respiration.
- (e) Explain the movement of energy and matter through the ecosystem.
- (f) Define biogeochemical cycles and discuss the water cycle, carbon cycle, and nitrogen cycle.
- (g) Define and discuss renewable and non renewable resources.
- (h) Discuss how the ecosystem is impacted by greenhouse effect, global warming, acid rain and ozone depletion.
- (i) Discuss season changes and changes caused by circulation of the earth=s atmosphere and water and changes in climate due to latitude and altitude.

WRITE UNIT 3 TEST

UNIT 4: Biology

- (a) Explain the cell as the basic unit of life.
- (b) Name major organelles.
- (c) Define and describe differences and similarities in prokaryotic and

- eukaryotic cells.
- (d) Discuss the differences between multicellular and unicellular organisms.
 - (e) Define DNA, discuss its structural make-up and replication.
 - (f) Define and discuss mitosis, chromosomes, genes and the genetic code.
 - (g) Distinguish between genotype and phenotype, sexual and asexual reproduction.
 - (h) Understand basic concepts of haploidy, diploidy, reproduction, inheritance and mutations.
 - (i) Discuss biotechnology: human genome project, genetic engineering, genetically modified organisms, cloning and their impact on society.

WRITE UNIT 4 TEST