

KCSE - FORM I BIOLOGY SYLLABUS

1.0.0 Introduction to Biology (5 Lessons)

2.0.0 Classification I (12 Lessons)

3.0.0 The Cell (20 Lessons)

4.0.0 Cell Physiology (20 Lessons)

5.0.0 Nutrition in Plants and Animals (59 Lessons)

1.0.0 INTRODUCTION (5 Lessons)

1.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define biology
- b) list branches of biology
- c) explain the importance of biology
- d) state the characteristics of living organisms
- e) state the main differences between plants and animals.

CONTENT:

1.2.1 Definition of biology

1.2.2 Branches of biology

1.2.3 Importance of biology

1.2.4 Characteristics of living organisms

1.2.5 Comparison between plants and animals

1.3.0 Practical Activities

1.3.1 Collecting, observing and recording external features of plants and animals.

2.0.0 CLASSIFICATION (12 Lessons)

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2.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) use the magnifying lens to observe the external features of plants and animals
- b) record observations of the main external characteristics of living organisms, preserved specimens and photographs
- c) state the necessity and significance of classification
- d) name the major units of classification
- e) state the application of Binomial nomenclature in naming organisms.

CONTENT:

2.2.1 Review the use of magnifying lens

2.2.2 External features of plants and animals

2.2.3 Necessity and significance of classification

2.2.4 Major units of classification: (naming)

Kingdoms

- Monera

- protocista

- fungi

- plantae

- animalia (At least one example of each)

For kingdom plantae and animalia, cover phylum/division, class, order, family, genus and species. Show relationship between the taxonomic units (Give at least one example of each taxon)

2.2.5 Discussion on Binomial nomenclature

2.3.0 Practical activities

2.3.1 Use of collecting nets, cutting instruments and hand lens.

Collection and detailed observation of:

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- small animals e.g. insects
- plants - rhizoids, root systems (taproot, fibrous and adventitious), stems and leaves.

3.0.0 THE CELL (20 LESSONS)

3.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define the cell
- b) state the purpose of a light microscope
- c) identify the parts of a light microscope and state their functions
- d) use and care for the light microscope and state the magnification
- e) identify the components of a cell as seen under the light and electron microscopes and relate their structure to functions
- f) compare plant and animal
- g) mount and stain temporary slides of plant cells
- h) describe animal cells as observed from permanent
- i) estimate cell size
- j) state the differences between cells, tissues, organs and organ systems.

CONTENT:

- 3.1 Definition of the cell
- 3.2.2 Structure and functions of parts of a light microscope
- 3.2.3 Use and care of the light microscope
- 3.2.4 Cell structure and functions as seen under
 - a light microscope
 - an electron microscope
- 3.2.5 Preparation of temporary slides of plant cells

3.2.6 Estimation of cell size

3.2.7 Cell specialization, tissues, organs and organ systems

3.3.1 Observe, identify, draw and state the functions of parts of the light microscope

3.3.2 Prepare and observe temporary slides of plant cells

3.3.3 Observe permanent slides of animal cells

3.3.4 Comparison between plant and animal cells

3.3.5 Observe, estimate size and calculate magnification of plant cells.

4.0.0 CELL PHYSIOLOGY (20 LESSONS)

4.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define cell physiology
- b) correlate the membrane structure with cell physiology in relation to permeability
- c) differentiate between diffusion, osmosis and active transport
- d) state and describe factors affecting diffusion, osmosis and active transport
- e) carry out experiments on diffusion and osmosis
- f) explain the roles of diffusion, osmosis and active transport in living organisms
- g) explain turgor and plasmolysis in terms of osmotic pressure

CONTENT:

4.2.1 Meaning of cell physiology

4.2.2 Structure and properties of cell membrane (Theories of membrane structure not required)

4.2.3 Physiological processes - diffusion, osmosis and active transport

4.2.4 Factors affecting diffusion, osmosis and active transport

4.2.5 Role of diffusion, osmosis and active transport in living organisms

4.2.6 Water relations in plant and animal cells: turgor, plasmolysis, wilting and haemolysis

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4.3.0 Practical Activities

4.3.1 Diffusion as demonstrated with Potassium permanganate or potassium iodide/flower dyes/coloured plant extracts/smoke

4.3.2 Experiments with visking tubing and living tissues: fresh arrow roots/cassava/sweet potatoes/leaf petioles/irish potatoes/carrots

4.3.3 Plasmolysis can be demonstrated by using any of the following: spirogyra, epidermal cells of onion or raw egg that has been put in dilute hydrochloric acid overnight.

5.0.0 NUTRITION IN PLANTS AND ANIMALS (59 LESSONS)

5.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define nutrition and state its importance in living organisms
- b) differentiate various modes of feeding
- c) describe photosynthesis and show its importance in nature
- d) explain how the leaf is adapted to photosynthesis
- e) explain the factors affecting photosynthesis
- f) distinguish between carbohydrates proteins and lipids
- g) state the importance of various chemical compounds in plants and animals
- h) explain the properties and functions of enzymes
- i) relate various types of teeth in mammals to their feeding habits
- j) differentiate between omnivorous, carnivorous and herbivorous modes of feeding
- k) relate the structures of the mammalian (human) alimentary canal to their functions
- i) explain the role of enzymes in digestion in a mammal (human)
- m) explain the factors that determine energy requirements in humans.

CONTENT:

5.2.1 Meaning, importance and types of nutrition

5.2.2 Nutrition in plants (autotrophism)

Definition of photosynthesis and its importance in nature

Adaptations of leaf to photosynthesis

Structure and function of chloroplast

Process of photosynthesis - light and dark stages (omit details of electron transport system and chemical details of carbon dioxide fixation)

Factors influencing photosynthesis

- light intensity

- carbon dioxide concentration

- water

- temperature

5.2.3 Chemical compounds which constitute living organisms

Chemical composition and functions of carbohydrates, proteins and lipids (omit details of chemical structure of these compounds and mineral salts in plant nutrition).

Properties and functions of enzymes (omit lock and key hypothesis)

5.2.4 Nutrition in Animals (heterotrophism)

Meaning and types of heterotrophism

Modes of feeding in animals

Dentition of a named carnivorous, herbivorous and omnivorous mammal

Adaptation of the three types of dentition to feeding

Internal structure of mammalian teeth

Common dental diseases, their causes and treatment

5.2.5 Digestive system and digestion in a mammal (human)

Digestive system, regions, glands and organs associated with digestion

Ingestion, digestion, absorption, assimilation and egestion

5.2.6 Importance of vitamins, mineral salts, roughage and water in human nutrition

5.2.7 Factors determining energy requirements in humans

5.3.0 Practical activities

5.3.1 Carry out experiments on factors affecting photosynthesis

5.3.2 Observe stomata distribution

5.3.3 Carry out food test experiments

5.3.4 Carry out experiments on factors affecting enzymatic activities

5.3.5 Investigate presence of enzymes in living tissues (plants and animals)

5.3.6 Observe, identify, draw and label different types of mammalian teeth

5.3.7 Carry out dissection of a small mammal to observe digestive system and associated organs (demonstration).