

KCSE - FORM III BIOLOGY SYLLABUS

10.0.0 Classification II (35 Lessons)

11.0.0 Ecology (55 Lessons)

12.0.0 Reproduction in Plants and Animals (50 Lessons)

13.0.0 Growth and Development (20 Lessons)

10.0.0 CLASSIFICATION II (35 LESSONS)

10.1.0 Specific Objectives

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

- a) state briefly the general principles of classification of living organisms
- b) state general characteristics of each of the five kingdoms
- c) state the main characteristics of arthropoda, chordata and major divisions of plantae
- d) name classes of spermatophyta
- e) describe the main characteristics of classes of phyla arthropoda and chordata
- f) use observable external features to construct simple dichotomous keys of plants and animals
- g) use already constructed dichotomous keys to identify organisms.

CONTENT:

10.2.1 Review of binomial nomenclature

10.2.2 General principles of classification

10.2.3 General characteristics of kingdoms

Monera

Protocista

Fungi

Plantae

Animalia

10.2.4 Main characteristics of major divisions of plantae

Bryophyta

Pteridophyta

Spermatophyta (cover only up to class level)

10.2.5 Main Characteristics of the Phyla Arthropoda and Chordata (cover up to classes as shown)

Arthropoda

- diplopoda chilopoda
- insecta
- crustacean
- arachnida

Chordata

- Pisces
- Amphibian
- Reptilian
- Ayes
- mammalia

10.2.6 Construction and use of simple dichotomous keys based on observable features of plants and animals

10.3.0 Practical activities

10.3.1 Examine live/preserved specimen or photographs of representatives of major divisions of plantae and phyla arthropoda and chordata

10.3.2 Construct simple dichotomous keys using leaves/parts of common plants/arthropods/ common chordates in the local environment

10.3.3 Use dichotomous keys to identify organisms.

11.0.0 ECOLOGY (55 LESSONS)

11.1.0 Specific Objectives

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

- a) define the terms ecology, habitat, biomass, ecosystem and carrying capacity

- b) identify the physical (abiotic) and biological (biotic) factors in a given ecosystem
- c) describe the inter relationships of organisms in the ecosystem
- d) differentiate between saprophytism, parasitism and symbiosis
- e) explain the importance of fungi and bacteria as decomposers
- f) relate the mode of transmission to prevention/control of named parasites
- g) describe the adaptive characteristics of named parasites to hosts
- h) explain the importance of symbiotic bacteria in leguminous plants
- i) describe the nitrogen cycle
- j) explain the flow of energy in the ecosystem
- k) identify and construct food chains and food webs, pyramid of numbers and pyramid of biomass
- i) explain the use of various methods of estimating population
- m) relate adaptations of plants to various habitats
- n) describe the effects of pollutants in air, water and soil on humans and other living organisms
- o) identify symptoms of different types of human diseases, methods of transmission and control.

CONTENT:

11.2.1 Concepts of Ecology

Ecology

Habitat

Niche

Population

Community Ecosystem

Biomass

Carrying capacity

11.2.2 Factors in an ecosystem

Abiotic factors (environmental factors) - light, temperature, atmospheric pressure, salinity, humidity, pH and wind

Biotic factors

Inter-relationships – competition, predation, saprophytism, parasitism and symbiosis

Nitrogen cycle

11.2.3 Energy flow in an ecosystem. Food chains, food webs, decomposers, pyramid of numbers and pyramid of biomass

11.2.4 Population estimation methods

Quadrat method

Line transect

Belt transect

Capture - recapture method

11.2.5 Adaptations of plants to various habitats

Xerophytes

Mesophytes (common terrestrial plants)

Hydrophytes - Nymphaea, Salvinia, spp

Halophytes — mangrove

11.2.6 Effect of pollution on human beings and other organisms Causes, effects and control of pollutants in air, water and soil

11.2.7 Human diseases

Bacterial diseases - Cholera and Typhoid

Protozoa - Malaria and Amoebic dysentery (Amoebiasis)

Ascaris lumbricoides and Schistosoma

- Mode of transmission
- Effects of the parasites on the hosts
- Adaptive characteristics of the parasites
- Control/prevention of diseases associated with the parasites

11.3.0 Practical activities

11.3.1 Collect, record, analyse and interpret data from ecological studies (examples of food chains should be used to join up to make food webs. Calculate ratios of consumers to producers from data provided)

11.3.2 Examine specimens of hydrophytes, mesophytes and xerophytes, and identify the features that adapt them to their habitats

11.3.3 Examine roots of legumes taken from fertile and poor soils to compare the number of root nodules

11.3.4 Estimate populations using sampling methods (for quadrat and line/belt transect, measure pI, temperature, wind direction and humidity)

12.0.0 REPRODUCTION IN PLANTS AND ANIMALS (50 Lessons)

12.1.0 Specific Objectives

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

- a) describe location and appearance of chromosomes and chromosome movement during mitosis and meiosis
- b) differentiate between mitosis and meiosis stating their significance in reproduction
- c) describe and state the importance of asexual reproduction, binary fission, spore formation and budding
- d) compare adaptations of wind and insect pollinated flowers
- e) describe the process of fertilization in flowering plants
- f) describe and explain how different fruits and seeds are formed and dispersed
- g) differentiate between internal and external fertilization as exhibited by amphibians and mammals (humans)
- h) relate structure of the human reproductive system to
- i) describe the role of hormones in human reproduction
- j) identify the symptoms and explain the method of transmission and prevention of sexually transmitted infections (S.T.Is)
- k) explain the advantages and disadvantages of sexual and asexual reproduction.

CONTENT:

12.2.1 Concept of reproduction

Importance of reproduction

12.2.2 Chromosomes, mitosis and meiosis (mention gamete formation)

12.2.3 Asexual reproduction

Binary fission in amoeba

Spore formation/reproduction in mucor/Rhizopus

Budding in yeast

12.2.4 Sexual reproduction in plants

Structure and functions of parts of named insect and wind pollinated flowers

Pollination and agents of pollination

Features and mechanisms that hinder self-pollination and self fertilization

The process of fertilization

Fruit and seed formation and dispersal

12.2.5 Sexual reproduction in animals

External fertilization in amphibians

Structure of the reproductive system of a named mammal (human) functions

Functions of the parts of reproductive system

Fertilization, implantation and the role of placenta

Gestation period

Role of hormones in reproduction in humans (secondary sexual characteristics, menstrual cycle)

12.2.6 Sexually transmitted infections (S.T.Is)

Gonorrhoea

Herpes simplex

Syphilis, Trichomoniasis, Hepatitis, Candidiasis

HIV/AIDS (Acquired Immune Deficiency Syndrome) - emphasize preventive measures especially change of behaviour

12.2.7 Advantages and disadvantages of asexual and sexual reproduction

12.3.0 Practical Activities

12.3.1 Examine stages of mitosis using squashed young onion tip/charts/electron micrographs

12.3.2 Examine stages of meiosis using anthers of a flower

12.3.3 Grow bread mould and examine using a hand lens

12.3.4 Examine spores in section of a fern

12.3.5 Examine various types of insect and wind pollinated flowers and relate structure to function

12.3.6 Collect, classify and dissect fruits and seeds and relate their structure to mode of dispersal

12.3.7 Dissect a small mammal to show organs associated with reproduction (demonstration).

13.0.0 GROWTH AND DEVELOPMENT (20 Lessons)

13.1.0 Specific Objectives

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

- a) differentiate growth from development
- b) analyse experimental data on growth rates
- c) identify parts of a named seed and factors affecting viability and dormancy in seeds
- d) investigate conditions necessary for germination and distinguish the types of germination
- e) measure one aspect of growth in a given seedling
- f) determine the region of growth in seedlings
- g) explain apical dominance
- h) distinguish between complete and incomplete metamorphosis in insects
- i) explain the role of hormones in regulating growth and development.

CONTENT:

13.2. 1 Concepts of growth and development

13.2.2 Growth and development in plants

Dormancy and ways of breaking it

Conditions necessary for germination

Epigeal and hypogeal germination

Measurement of one aspect of growth in a named seedling e.g. region of growth

Primary and secondary growth

Role of growth hormones in plants

Apical dominance

13.2.3 Growth and development in animals

Complete and incomplete metamorphosis in insects

Role of growth hormones in insects

13.3.0 Practical activities

13.3. Examine, draw and differentiate seeds

13.3.2 Determine the region of growth in shoots and roots

13.3.3 Investigate hypogeal and epigeal germination

13.3.4 Carry out experiments to demonstrate apical dominance

13.3.5 Observe stages of complete and incomplete metamorphosis in insects

13.4.0 Project work:

Measure either length of internodes/ breadth of leaves/height/dry weight of seedlings over a known period of time, analyse and present the data obtained in form of graphs, charts or histograms.