BIOLOGY SYLLABUS: Ordinary level

Biology syllabus for secondary schools form I-IV in Tanzania, 2010 Edition.

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Form One

1. Introduction To Biology

1. Basic Concepts and Terminologies of Biology
    1. Explain the meaning of basic biological concepts and terminologies
    2. Outline the characteristics of living things
    3. Explain the importance of studying biology
    4. Relate biological science with other related fields
2. Scientific Processes in Biology
    1. Use own sense organs to make correct observations
    2. Take measurements of mass, length, temperature and pulse rate
    3. Carry out simple biological experiments
3. The Biology Laboratory
    1. Describe the biology laboratory
    2. Distinguish the biology laboratory from other school facilities
    3. Interpret warning signs on containers of laboratory chemicals and apparatus
    4. Identify common apparatus and equipment of biology laboratory

2. Safety In Our Environment

1. First Aid
    1. Explain the meaning and importance of first aid at home and at school
    2. Identity components of the first aid kit and their uses
    3. Outline procedures of giving first aid to various victims
2. Safety at Home and School
    1. Mention common accidents at home and school
    2. Outline ways of preventing accidents at home and school
    3. Explain ways of maintain safety at home and school
3. Waste Disposal
    1. Explain the terms “Waste” and waste disposal
    2. Identify types of waste
    3. Outline basic principle of waste disposal
    4. Demonstrate proper ways of disposing waste
    5. Explain effects of poor waste disposal
    6. Suggest proper ways of disposing waste in the surrounding community
4. The Concept of Health and Immunity

1. Explain the concepts of health and immunity
2. Mention types of body immunity and their importance
3. State factors which affects body immunity

5. Personal Hygiene and Good Manners
    1. Explain concepts of personal hygiene and good manners
    2. Outline principle of personal hygiene and good manners
    3. Mention requirements of personal hygiene and good manners
    4. Outline ways of maintaining proper personal hygiene during puberty
    5. Explain the importance of personal hygiene and good manners
6. Infections and Diseases
    1. Explain the meaning of the terms infection and disease
    2. Mention common infections and diseases
    3. Explain the causes, symptoms, mode of transmission and effects of common infections and diseases
    4. Suggest appropriate preventive and control measures for common infections and diseases
7. Human Immune Deficiency Virus (HIV) Acquired Immune Deficiency Syndrome (AIDs)
    1. Explain the meaning of HIV/AIDs, STIs, and STDs
8. Sexually Transmitted Infections (STIs) and Sexually Transmitted Diseases(STDs)
    1. Explain causes, symptoms, mode and transmission and effects of HIV/AIDs, STIs and STDs
    2. Outline the preventive and control measures of HIV?AIDs, STIs and STDs
9. Management of STIs and HIV/AIDs
    1. Explain ways of avoiding risky situations, risky behaviours and practices
    2. Demonstrate necessary skills for avoiding risky behaviours, practices and situations
10. Care and Support of people living with HIV/AIDS (PLWHA)
    1. Explain the importance of providing care and support to PLWHA in the family community and at school
    2. Outline necessary care and support services provided to PLWHA in the family, community and at school
    3. Explain the effects of discrimination and stigma to people living with HIV/AIDS to the individual, family and society

3. Cell Structure And Organization

1. The Concept of Cell
    1. Explain the meaning of the cell
    2. Mention the characteristics of the cell
    3. Differentiate various types of cells
    4. Explain the functions of different parts of plant and animal cells
    5. Draw and label plant and animal cell
    6. Outline similarities and differences of plant and animal cells
2. Cell Differentiation
    1. Explain the concept of cell differentiation

2. Outline the importance of cell differentiation and formation of tissues, organs and body systems
3. Differentiate cells, tissues organs and body systems

4. Classification Of Living Things

1. Concept of Classification
    1. Explain the concept of classification
    2. Group living things according to their similarities and differences
    3. Explain the importance of classifying living things
2. Classification Systems
    1. Outline types of classification systems and their differences
    2. Explain merits and demerits of each type of classification system
    3. Carry out practical activities of classifying living things according to artificial and natural classification systems
3. Major Groups of Living Things
    1. Mention major groups of living things
    2. Outline ranks of classification
    3. Carryout practical activities of grouping organisms into their respective major groups
4. Viruses
    1. Explain general and distinctive features of viruses
    2. Describe the structure of viruses
    3. Outline advantages and disadvantages of viruses
5. Kingdom Monera
    1. Explain general and distinctive features of the kingdom monera
    2. Describe structures of the representative organisms of the kingdom monera
    3. Outline the advantages and disadvantages of the kingdom monera
    4. Outline the characteristics of pathogenic and non-pathogenic bacteria
6. Kingdom Protoctista
    1. Explain general and distinctive features of the kingdom protoctista
    2. Mention phyla of the kingdom protoctista
    3. Describe structure of amoeba and paramecium
    4. Explain the advantages and disadvantages of amoeba, euglena paramecium and plasmodium

Form Two

1. Classification Of Living Things

1. Kingdom Fungi
    1. Explain the general and distinctive features of the kingdom Fungi
    2. State the phyla of the Kingdom Fungi
    3. Describe the structure of mosses
    4. Outline advantage and disadvantages of Mosses
2. Division Filicinophyta (Pteridophyta)
    1. Explain general and distinctive features of the division Filicinophyta
    2. Describe the structure of Ferns
    3. Outline advantages and disadvantages of ferns

2. Nutrition

1. Concepts of Nutrition and food Nutrients
    1. Explain the concepts of nutrition and food nutrients
    2. Outline the importance of nutrition in living things
2. Nutrition in Mammals, Human Nutrition
    1. Identify different types of food substances and their functions in human Body
    2. Explain the concept of balanced diet in terms of food quality and quantity
    3. Explain nutritional requirement for different groups of people
    4. Outline different types of nutritional deficiencies and disorders in human beings
    5. Explain the causes , symptoms, effect and control measures of nutritional deficiencies and disorders
3. Digestive System in Human
    1. Identify parts of the human digestive System and their adaptive features
    2. Explain the digestion process in process in human being
    3. Compare the human digestive system with that of other mammals
    4. Outline common disorders and diseases of the human digestive System
    5. Explain causes, symptoms, effects and control measures of common disorders and diseases of the human digestive system
4. Nutrition in Plant, Mineral requirement in Plants
    1. Mention essential mineral element in plant nutrition
    2. Investigate the roles of essential elements in plant nutrition
5. Photosynthesis
    1. Explain the concept of photosynthesis
    2. Describe the structure of the leaf in relation to photosynthesis
    3. Explain the process of photosynthesis
    4. Outline the importance of photosynthesis in the real life situation
6. Properties of Food Substance
    1. Mention the basic food substances and their properties
    2. Identify common reagents and chemicals used to determine food Properties

3. Carryout food tests for reducing sugars, non reducing sugars, starch, proteins and lipids (Fats and Oil)

7. Food Processing, Preservation and Storage.
    1. Explain the concept of food processing , food preservation and food storage
    2. Explain the importance of food processing, preservation and storage
    3. Differentiate between traditional and modern methods of processing, preserving and storing food

3. Balance Of Nature

1. The Natural Environment
    1. Explain the concept of natural environment
    2. Describe biotic and abiotic components of the environment
    3. Identify various organism in their natural environment in the community
    4. Explain the importance of the natural environment
2. Interactive of Organisms in the Environment
    1. Identify ways in which living organisms interact with the non living component of the environment
    2. Explain the interaction of organisms among themselves
3. Food Chain and Food Web
    1. Explain the meaning of food chain and food web
    2. Mention the components of a food chain and food web
    3. Distinguish food chain from food web
    4. Construct a diagrammatic representation of a food chain and food web
    5. Explain the significance of food chain and food web in real life situation

4. Transportation Of Materials In Living Things

1. The Concept of Transportation of Materials in Living Things
    1. Explain the concept of transportation of materials in living things
    2. Outline the importance of materials in living things
2. Diffusion, Osmosis and Mass- flow
    1. Explain the meaning of osmosis, diffusion and mass- flow
    2. Carryout experiments to demonstrate the process of diffusion, osmosis and mass flow
    3. Outline the differences between diffusion, osmosis and mass flow
    4. Explain the roles of diffusion, osmosis and mass flow in movement of materials in living organisms
3. Transport of Materials in Mammals, the Structure of the Mammalian Heart
    1. Describe the external and internal structures of the mammalian heart
    2. Explain the functions of the external and internal parts of the mammalian heart
    3. Explain the adaptations of the parts of the mammalian heart to their functions
    4. Describe the structure of arteries, veins and capillaries
    5. Carry out simple experiments to determine pulse rates in human being
4. The Blood
    1. List the major components of the blood
    2. Explain the function of major blood components

3. Explain the effects of HIV on white blood cells

5. Blood Groups and Blood Transfusion
    1. Explain the concepts of blood group and blood transfusion
    2. Outline the relationship between blood groups and blood transfusion
    3. Explain the advantages and disadvantages for blood transfusion
    4. Outline precautions to be taken during blood transfusion
6. Blood Circulation
    1. Describe blood circulation in humans
    2. Explain the importance of blood circulation in humans
    3. Mention disorders and diseases of the human blood circulatory system
    4. Outline the causes, symptoms and effects and control/measures of the disorders and diseases of the human blood circulatory system
    5. Carry out practical exercises to measure human pulse rate and blood pressure
7. The Lymphatics System
    1. Explain the concept of lymphatics
    2. Describe the components of the human lymphatic system
    3. Mention the common disorders and diseases of the lymphatic system
    4. Explain causes, symptoms, effects and prevention of disorders and diseases of the human lymphatic system
8. Transport of Material in Plants in Plants, the Vascular System
    1. Explain the concept of vascular system
    2. Describe components of vascular system
    3. Explain the function of vascular system in plants
9. Absorption and Movement of Water and Mineral Salts in Plants
    1. Explain the functions of root hairs in absorption and movement of water and mineral salts in plants
    2. Outline the movement of water and dissolved mineral salts in plants
    3. Conduct experiments to demonstrate transpiration pull, root pressure and capillarity
    4. Explain the concept of transpiration
    5. Outline the significance of transpiration in plants
    6. Outline factors affecting the rate of transpiration in plants

5. Gaseous Exchange And Respiration

1. The Concept of Gaseous Exchange
    1. Identify organs responsible for gaseous exchange in living organisms
    2. Explain the concept of gaseous exchange
2. Gaseous Exchange in Mammals
    1. Identify parts of the respiratory system
    2. Describe the features of different parts of the respiratory system and their adaptive features
    3. Describe the mechanism of gaseous exchange in mammals
    4. Describe gaseous exchange across the alveolus
    5. Outline factors affecting gaseous exchange in mammals
3. Gaseous Exchange in Plants
    1. Identify parts of plant responsible for gaseous exchange

    2. Describe the process of gseous exchange in plants
    3. Explain the importance of gaseous exchange in plants
4. Respiration
    1. Explain the concept of respiration
    2. Mention types of respiration
5. Aerobic Respiration
    1. Explain the concept of aerobic respiration
    2. Outline the mechanism of aerobic respiration
    3. Carry out experiments on aerobic respiration
    4. Describe factors which affect the rate of respiration
6. An Aerobic Respiration
    1. Explain the concept of anaerobic respiration
    2. Outline the mechanism of anaerobic respiration
    3. Mention the end products of anaerobic respiration
    4. Carry out an experiment to demonstrate the application of anaerobic respiration
    5. Distinguish between aerobic respiration and anaerobic respiration
7. Infection and Diseases of the Respiratory System
    1. Mention common airborne infections and diseases which affect the respiratory system
    2. Explain the causes, symptoms, effects and control measures of common infections and diseases of the respiratory system
8. Disorders of the Respiratory System
    1. Mention disorders of the respiratory system
    2. Explain causes, symptoms and effects of the disorders of the respiratory system
    3. Relate disorders of the respiratory system and HIV/AIDS
    4. Suggest ways of preventing and controlling disorders of the respiratory system

Form Three

1. Classification Of Living Things

1. Kingdom Plantae, Division Coniferophyta (Conifers)
    1. Explain general and distinctive features of the division coniferophyta
    2. Describe the structure of pinus
    3. Explain the advantages and disadvantages of the division coniferophyta
2. Division Angiospermophyta (Flowering Plants)
    1. Explain general and distinctive features of the division angiospermophyta
    2. Outline the classes of the division angiospermophyta and their distinctive features
    3. Describe the structure of representative plants under each class (Monocotyledonae and Dicotyledonae)
    4. Explain advantages and disadvantages of division dngiospermophyta

2. Movement

1. Concept of Movement and Locomotion
    1. Explain the concept of movement and locomotion
    2. Explain the importance of movement in animals and plants
    3. Demonstrate movement and locomotion actions
2. Movement of the Human Body, the Human Skeletal System
    1. Describe the structures of human skeleton
    2. Explain the functions of the major components of the human skeleton and their adaptations
3. Muscles and Movement
    1. Explain the concept of muscles
    2. Mention types of muscles
    3. Demonstrate how muscles facilitate movement
    4. Describe the structure of muscles
    5. Explain adaptations of different types of muscles to their roles
    6. Explain causes effects and preventive measures of m cramps
4. Movement in Plants
    1. Explain the concept of movement in plants (movement of curvature)
    2. Mention types of movement exhibited by plants
    3. Carry out experiments to investigate movement in plants

3. Coordination

1. Concept of Coordination.
    1. Explain the concept of coordination in organisms
    2. Outline the ways in which coordination is brought about
2. Nervous Coordination in Human , Neurons
    1. Describe the structure of motor sensory and relay neurons
3. Central Nervous System (CNS)
    1. Give the meaning of central nervous system
    2. Identify the components of the central nervous system and their functions

3. Describe the structure of the spinal cord and brain
4. Peripheral Nervous System (PNS)
    1. Give the meaning of peripheral Nervous System
    2. Identify the components of the peripheral nervous system and their functions
5. Reflex Action
    1. Give the meaning of reflex action
    2. Describe the neuronic path of a reflex action
    3. Distinguish simple reflex from conditioned reflex action
6. Sense Organs
    1. Explain the meaning of a sense organ
    2. Identify types of Sense organs and their relative position
    3. Describe the structure of each sense organ
    4. Explain the functions of sense organs and their adaptive features
7. Drugs and Drug Abuse in Relation to Nervous Coordination
    1. Explain the meaning of drugs and drug abuse, in relation to nervous coordination
    2. Outline proper ways of handling and using drugs
    3. Explain causes and effects of drug addiction
    4. Suggest preventive and control measures of drug abuse
    5. Identify location of the different endocrine glands in the mammalian body
    6. Explain the role of hormones produced by each endocrine gland
    7. Outline disorders of hormonal coordination in mammals
8. Coordination in Plant, Concept of Tropic and Nastic Responses
    1. Explain the concept of tropic and nastic responses
    2. Carry out experiments to investigate the effects of tropic and nastic responses in plants
    3. Explain the importance of tropic and nastic responses

4. Excretion

1. Concept of Excretion
    1. Explain the concept of excretion
    2. Give examples of excretory products eliminated by organisms
2. Excretion in Human
    1. Mention excretory organs in human being
    2. Describe the urinary system and its adaptive features
    3. Explain the process of urine formation
3. Complications and Disorders of the Excretory System
    1. Mention common complications and disorders of the excretory system
    2. Explain the causes, symptoms, effects and control measures of common complications and disorders of the excretory system
4. Excretion in Plants
    1. Mention types of excretory products eliminated by plants
    2. Explain the importance of common excretory products of plants

5. Regulation

1. Concept of Regulation
    1. Explain the concept of regulation

    2. Mention various types of regulation
2. Temperature Regulation in Animals
    1. Explain the concept of temperature regulation in animals
    2. Carry out practical activities to determine Temperature Regulation in Mammals
    3. Describe the mechanism of temperature regulation in mammals
3. Osmoregulation in Mammals
    1. Explain the concept of osmoregulation
    2. Mention factors which affects the contents of salt and water in the body
4. Blood Sugar Regulation in Mammals
    1. Explain the mechanisms of regulating sugar level in t he blood
    2. Outline the causes, symptoms, and effects of high and low sugar levels in the blood

6. Reproduction

1. Concept of Reproduction
    1. Explain the merits and demerits of sexual and asexual reproduction
2. Meiosis and Reproduction
    1. Give the meaning of meiosis
    2. Explain the significance of meiosis in relation to reproduction
    3. Carry out experiments to show stages of meiosis process
3. Reproduction in Flowering Plants, the structure of the Flower
    1. Describe the structure of the flower
    2. Identify reproductive parts of the flower
4. Pollination
    1. Explain the term pollination
    2. Identify types of pollination
    3. Outline agents of pollination
5. Fertilization
    1. Explain the concept of fertilization
    2. Explain process of fertilization in flowering plants
6. Reproduction in Mammals
    1. Describe the male and female reproductive systems
7. Gamete Formation and Fertilization
    1. Outline the process of gamete formation in mammals
    2. Explain the processes of ovulation and menstruation
    3. Explain the process of fertilization pregnancy and child birth
    4. Outline factors which may hinder fertilization
    5. Explain the concept of artificial insemination and its importance
8. Multiple Pregnancies
    1. Give the meaning of multiple pregnancies
    2. Explain the causes of multiple pregnancies
    3. Differentiate between identical twins and fraternal twins
9. Disorders of Reproductive System
    1. Mention types of disorders of human reproductive system
    2. Explain the causes and effects of the reproductive system disorders
    3. Suggest possible remedies of reproductive system disorder

10. Complication of the Reproductive System
    1. Mention types of complications of the reproductive systems
    2. Outline causes of complications of the reproductive system
    3. Suggest ways to minimize the occurrence of complications and disorders of the reproductive system
11. Sexuality and Sexual Health and Responsible Sexual Behaviour
    1. Explain the concept of sexuality
    2. Mention social cultural factors influencing sexual behaviour in different age groups of people
    3. Differentiate responsible from irresponsible sexual behaviour and their impact on oneself family and community
    4. Suggest ways of eradicating irresponsible sexual behaviours/ practices in the family and community
    5. Mention appropriate life skills required to cope with adolescent sexuality and sexual behaviour
12. Family Planning and Contraception
    1. Explain the concept of family planning and contraception
    2. State social practices which enhance family planning
    3. Outline the importance of male involvement in family planning
13. Maternal and Child Care
    1. Explain the concept of maternal and child care
    2. Mention social-cultural factors which affect material and child care in the family and community
    3. Suggest appropriate ways of providing maternal and child care for people living with HIV/AIDS (PLWHA)

Form Four

1. Growth

1. Concept of Growth
    1. Explain the concept of growth
    2. Investigate internal and external factors affecting growth in plants and animals
2. Mitosis and Growth
    1. Explain the concept of mitosis
    2. Illustrate stages of mitosis
    3. Explain the significance of mitosis in the growth
3. Growth and Developmental Stages in Human
    1. Explain growth and development in human being
    2. Explain the stages of human post–natal growth and development
    3. Explain physiological, psychological and behaviour changes associated with growth and development
    4. Outline factors which affect the rate of physical deterioration of human body and services required to meet the needs of an individual at each stage
4. Growth in Flowering Plants
    1. Explain the concept of seed germination
    2. Outline changes which occur during seed germination
    3. Investigate conditions necessary for seed germination
    4. Carry out practical activities to demonstrate epigeal and hypogeal germination

2. Genetics

1. Concept of Genetics
    1. Explain the concept of the genetics
    2. State common terms used in genetics
2. Genetics Materials
    1. Explain the concept of genetics Materials
    2. Describe the structure and composition of genetics materials (Deoxyribonucleic Acid and Ribonucleic Acid)
    3. Differentiate Deoxyribonucleic Acid (DNA) from Ribonucleic Acid (RNA)
3. Principle of Inheritance, Concept of Inheritance
    1. Explain the concept of inheritance
4. Mendelian Inheritance
    1. State Mendel's first law of inheritance
    2. Illustrate monohybrid crosses and interpret their results of crosses and ratios
    3. Interpret data from monohybrid experiments to demonstrate mendel's first law of inheritance
    4. Illustrate patterns of inheritance that follow mendel's first law
5. Non-Mendelism Inheritance

1. Explain concepts of incomplete dominance and Co-dominance
2. Illustrate patterns of inheritance that deviates from mendel's first law of inheritance

6. Sex Determination and Inheritance
    1. Describe the mechanism of sex determination and inheritance
    2. Explain the concept of sex linked, sex Limited and sex influenced characters
    3. Explain consequences of sex preference and sex selection
7. Variation Among Organisms
    1. Explain the concept of variation
    2. Identify variations among organisms
    3. Give the meaning of continuous and discontinuous variations
    4. Differentiate continuous from discontinuous variation
    5. Explain causes of variation among organisms
8. Genetic Disorders
    1. Give the meaning of genetic disorders
    2. Cite examples of genetic disorders
    3. Explain the causes and effects of genetic disorders
9. Application of Genetics
    1. Outline application of genetics in everyday life
    2. Explain the importance of genetics in biological science and related fields

3. Classification Of Living Things

1. Kingdom Animalia
    1. Explain general and distinctive features of the kingdom animalia
    2. Mention the major phyta of the kingdom animalia
2. Phylum Platyhelminthes
    1. Explain the general and distinctive features of the phylum platyhelminthes
    2. Describe the structure of organisms under the phylum latyhelminthes
3. Phylum Aschelminthes (Nematoda)
    1. Explain general and distinctive features of the phylum aschelminthes
    2. Describe the structure of organisms under the phylum aschelminthes
    3. Outline the advantages and disadvantages of roundworms
4. Phylum Annelida
    1. Explain general and distrinctive features of the phylum annelida
    2. Describe structure of organism under the phylum annelida (Earthworm)
    3. Explain advantages and disadvantages of lumbricus (Earthworm)
5. Phylum Arthropoda
    1. Explain general and distinctive features of the phylum arthropoda
    2. Mention classes of the phylum arthropoda
    3. Cite examples of organisms under each class of the phylum artropoda
    4. Explain distinctive features of each class of the phylum arthropoda
    5. Describe structures of representative organisms under each class
    6. Explain the advantages and disadvantages of the organisms under each class of phylum arthropoda
6. Phylum Chordata

1. Explain general and distinctive characteristics features of the phylum chordata
2. Mention classes of the phylum chordate
3. Explain distinctive features of each class of the phylum chordata
4. Describe structure of representative organisms in each class of phylum chordata
5. Outline the advantages and disadvantages of organisms under each class of phylum chordata

4. Evolution

1. Concept of Organic Evolution
    1. Explain the concept of organic evolution
2. Theories of the Origin of Life
    1. Outline the basic ideas about the origin of life
    2. State the theories of the origin of life
3. Theories of Organic Evolution , Lamarckism
    1. State lamarck's theory of evolution
    2. Explain lamarck's observations and deductions
    3. Outline merits and demerits of lamarck's theory of evolution
4. Darwinism
    1. State Darwin's theory of evolution
    2. Investigate evidences and application of organic evolution in the real life situation

5. Human Immunodeficiency (HIV) Acquired Immune Deficiency Syndrome (AIDS) And Sexually Transmitted Infections (STIs)

1. Relationship Between HIV, AIDS and STIs
    1. Distinguish between HIV, AIDS and STIs
    2. Explain the relationship between HIV and STIs
2. Management and Control of HIV/AIDS and STIs
    1. Outline ways of managing and controlling HIV, AIDS and STIs
    2. Mention the life skills needed for home based care for PLWHA
    3. Mention precautions to be taken when handling people living with HIV/AIDS (PLWHA) and STIs
3. Counseling and Voluntary Testing (CVT)
    1. Explain the concept of counselling and voluntary testing
    2. Outline the significance of CVT in the control and prevention of HIV/AIDS and STIs
    3. Explain the procedures and techniques of CVT for HIV/AIDS