# INSTITUTE OF ADULT EDUCATION
# OPEN AND DISTANCE LEARNING PROGRAMME


## INCREASING ACCESS TO SECONDARY EDUCATION THROUGH OPEN AND DISTANCE LEARNING (OLD)

## BIOLOGY
## SYLLABUS FOR NON FORMAL EDUCATION PROGRAMME

2007

Designed and prepared by:

The Department of Distance Education
Institute of Adult Education
Dar es Salaam
**Tanzania**

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## Introduction

The Biology syllabus is in modular format and in two stages, Stage I and II, stage I is equivalent to Form I and II, whereas Stage II is equivalent to Form III and IV. The Syllabus has been developed for non-formal education system, but can as well be used for formal Education System. The Syllabus is complete in the sense that it is skill oriented that is, one can apply it for his/her daily life and sit for various examinations including the Form IV National Examination prepared and administered by the National Examinations Council of Tanzania (NECTA).

The Syllabus has been condensed so as to be covered in a short period such that stage I syllabus, which is equivalent to Form I and II syllabi, is covered within a year (the first year) instead of two (2) years. In the same way, stage II syllabus, which is equivalent to Form III and IV in formal education system, is to be covered in the second year. With this arrangement, it is expected that Form I – IV equivalent syllabus will be covered in a minimum of two years instead of four (4) years.

This Syllabus has undergone several stages. Initially, it was developed through a workshop which comprised of Biology subject experts from Dar es Salaam secondary schools, teachers colleges and some retired curriculum developers, and (there after) it was moderated by curriculum developers from Tanzania Institute of Education (TIE) and lecturers from the Open University of Tanzania and University of Dar es Salaam.

## General Objective of the Syllabus

The general objective of this course is to equip the learners with basic biology knowledge and skills so as to promote logical thinking, rational mind and increase capacity of dealing with day to day social, economic and cultural problems.

After completing this course, the learner should be able to:

1. Attempt Open and Distance Learning (ODL) examinations.
2. Attempt Certificate of Secondary Education Examination (CSEE).
3. Join Higher Education in tertiary Colleges or Schools.
4. Apply the skills directly in the field of work.

**Target Groups**

This syllabus caters for the following categories of people:

- Secondary school dropouts
- Out of school youths
- Adults
- Less able (physically handicapped)
- Marginalized groups.

**The Structure of the Syllabus**

The Biology Syllabus which is in Modular format consists of two parts called stages, stage I, and II. Each Module carries a topic and consists of a number of Units. The content of the course has been presented into stages and stages into modules and modules into units.

There are 8 modules for the whole course consisting of 18 units as follows:

**Stage I** (Form I and II equivalent) has a total of 5 modules as follows:

Module 1 – 3 is Form One equivalent and has 6 units.

Module 4 – 5 is Form Two equivalent with 5 units.

**Stage II** (Form III and IV equivalent) has a total of 3 modules and 7 units as follows:

Module 6 – 7 is Form Three equivalent with 4 units.

Module 8 is Form Four equivalent with 3 units.

Each unit is again subdivided into a number of subtopics and each subtopic has specific objectives to guide the learner and tutor to attain the topic objectives in the module.

**Module Contents**

**TEWWB$_1$ (FORM I AND II EQUIVALENT FOR ONE YEAR)**

**Form I Equivalent (6 Months)**

**MODULE 1: INTRODUCTION TO BIOLOGY**

Unit 1.1: Introduction to Biology.
Unit 1.2: The Biology Laboratory and First Aid.

**MODULE 2: SAFETY IN OUR SURROUNDING**

Unit 2.1: Safety in our surrounding.
Unit 2.2: Healthy and Prevention of Diseases.

**MODULE 3: CLASSIFICATION AND CELL**

UNIT 3.1: Classification of Living Organisms.
UNIT 3.2: Cell Structure and Organization.

**Form II Equivalent (6 Months)**

**MODULE 4: NUTRITION, TRANSPORT OF MATERIALS AND NATURE.**

Unit 4.1: Nutrition.
Unit 4.2: Transport of Materials in Organisms.
Unit 4.3: Balance of Nature.

**MODULE 5: GASEOUS EXCHANGE AND RESPIRATION**

Unit 6.1: Gaseous Exchange.
Unit 6.2: Respiration.

**TEWWB$_2$ (FORM III AND IV EQUIVALENT FROM ONE YEAR)**

**Form III Equivalent (6 Months)**

**MODULE 6: COORDINATION AND CONTROL**

Unit 6.1: Movement.
Unit 6.2: Coordination.
Unit 6.3: Excretion and Regulation.

**MODULE 7: REPRODUCTION**

Unit 7.1: Reproduction.

**Form IV Equivalent (6 Months)**

**MODULE 8: GROWTH, GENETICS AND EVOLUTION**

Unit 8.1: Growth.
Unit 8.2: Genetics.
Unit 8.3: Evolution

**BIOLOGY MODULES AND THEIR EQUIVALENCE**

| | | | |
|---|---|---|---|
| TEWW B$_1$: | Modules: | 1 – 3 | Equivalent to Form One |
| | Modules: | 4 – 5 | Equivalent to Form Two |
| TEWWB$_2$: | Modules: | 6 – 7 | Equivalent to Form Three |
| | Modules: | 8 | Equivalent to Form Four |

**Assessment of Learners' Progress and Performance**

Assessing learners' progress and performance is a normal practice for facilitators. It is expected that every learner will do self exercises, exercises marked by tutors, monthly examinations for face to face learners, and at stage II (equivalent to form IV) final examination administered by the IAE and those administered by the National Examination Council of Tanzania (NECTA) (the latter is optional).

# STAGE I

## OBJECTIVES

After completing Biology stage I, the learner should be able to:

1. Attain competencies in basics of Biology.
2. Attempt qualifying/aptitude test in Biology.
3. Apply Biology knowledge in your day to day activities.
4. Apply Biology knowledge in other disciplines.
5. Use the knowledge and skills forwards attained in the next stage (stage II).

# STAGE I: FORM I AND II EQUIVALENT

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| 1. INTRODUCTION TO BIOLOGY | 1.1. Introduction to Biology | 1.1.1. Basic concept of biology. | The learner should be able to:-<br>1. Explain the basic concept of biology such as science, biology and branches of biology.<br>2. Give roles and importance of biology in daily life.<br>3. Identify characteristics of living organisms.<br>4. Relate biological science with other related fields e.g. agriculture, forestry, medicine and nutrition. | (i) Learner to make self study on the introduction to biology.<br>(ii) Learners in groups to discuss the importance of studying biology.<br>(iii) Facilitator to lead learners to discuss the importance of studying biology.<br>(iv) Learners to observe /listen/watch different organisms in their surrounding and identify their characteristics.<br>(v) Facilitator to guide learners to discuss the relationship between biology and other related fields such as agriculture, forestry, medicine and nutrition. | • Variety of living organisms.<br>• Pictures of different living organisms.<br>• Magazines.<br>• Journals.<br>• Text extracted from various sources on the relationship between biology and other related fields.<br>• Tactile pictures of different organisms. | Can the learner:<br>a). Explain Basic concept of biology?<br>b). Give the Importance of biology in daily life?<br>c). Characteristics of living organisms?<br>d). Relate biological science with other related fields? | 3 hrs | 20 hrs |
| | 1.2. Biology Laboratory and First Aid. | 1.2.1. Science processes. | The learner should be able to:-<br>1. Explain scientific methods of studying biology. | Learner to make self study on the methods of studying biology. | • Variety of living organisms and non living organisms. | Can the learner explain scientific methods of studying biology? | | |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 1.2.2. Biology Laboratory. | The learners should be able to:-<br>1. Describe the biology laboratory.<br>2. Identify common apparatus and chemicals. | i) Learners to visit a nearby secondary school biology laboratory and listen/watch/ observe common apparatus and chemicals.<br>ii) Facilitator to guide learners to describe the laboratory tools and chemicals.<br>iii) Facilitator to guide the learners to identify and name the common apparatus and chemicals. | • Variety of biology laboratory tools and apparatus labeled in print/braille.<br>• List of laboratory rules in print/braille<br>• Variety of common chemicals labelled in print/Braille. | Can the learner<br>a) Describe the Biology laboratory?<br>b) Identify common apparatus and chemicals? | | |
| | | 1.2.3. First Aid. | The learner should be able to:-<br>1. Explain the meaning and importance of First Aid at home and our surrounding.<br>2. Apply different procedures of rendering First Aid to various victims.<br>3. Prepare a First Aid Kit. | i) Learners to design procedures of giving first aid to various victims.<br>ii) Facilitator to follow up the learners practice and make appropriate clarifications and corrections.<br>iii) Facilitator to assign learners to prepare a First Aid Kit.<br>iv) Learners to prepare a First Aid Kit as project work.<br>v) Learners to visit a nearby health centre and get clarification from the centre worker on first aid. | Label: all items in both print /Braille:<br>• First Aid Kit<br>• Clean water<br>• Blanket<br>• Sand<br>• Soap<br>• Charts on First Aid<br>• Components of First Aid.<br>• Vanish<br>• .Wood<br>• Knife<br>• Tactile charts on First Aid<br>• Sign Language interpreter. | Can the learner<br>a) Explain the meaning of First aid?<br>b) Apply different procedures on rendering First Aid?<br>c) Prepare First Aid Kit? | | |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| 2. SAFETY IN OUR SURROUNDING | 2.1. Safety in Our Surrounding | 2.1.1. Personal hygiene and good manners. | The learner should be able to:-<br>1. Explain the concept of personal hygiene and good manners.<br>2. Outline the principles of personal hygiene and good manners.<br>3. Mention the equipments of personal hygiene and good manners.<br>4. Explain the importance of personal hygiene and good manners. | i) Learners to make self study of extracted text from various sources on personal hygiene and good manners.<br>ii) Learners to outline the principles of personal hygiene and good manners. | • Pictures of people with characteristics of good manners.<br>• Print/tactile charts of principles of personal hygiene and good manners.<br>• Print/tactile picture showing variety of equipments for personal hygiene and good manners.<br>• Sign language interpreter. | Can the learner<br>a) Explain the concept of personal hygiene and good manners?<br>b) Mention the equipments and explain the importance of personal hygiene and good manners? | | 30 hrs |
| | | 2.1.2. Waste disposal. | The learner should be able to:-<br>1. Explain the terms waste and waste disposal and identify types of waste.<br>2. Outline the ways of disposing waste.<br>3. Explain the effects of poor waste disposal. | i) Learners to make self study on Waste and Waste disposal.<br>ii) Learners to classify waste and waste disposal.<br>iii) Learners to demonstrate proper ways of disposing wastes. | • Journals<br>• Printed/brailed text extracts from various sources on waste and waste disposal.<br>• Liquid waste and solid waste labelled in print /brailed.<br>• Print /tactile pictures showing variety of wastes. | Can the learner:<br>a) Explain the terms waste and waste disposal and identify types of waste?<br>b) Outline the ways of disposing waste and effects of poor waste disposal? | | |
| | 2.2. Health and Prevention of Diseases | 2.2.1. The concept of heath and immunity. | The learner should be able to:-<br>1. Explain the concept of health and immunity.<br>2. Mention the types of immunity their importance in good health and factors which affect body immunity. | i) Learner to make self study on health and immunity.<br>ii) Learner to visit a nearby health centre to get clarifications on health and immunity orally or through sign language. | • Print/tactile pictures /photographs showing people with good health.<br>• Journals<br>• Print /tactile charts on health and body immunity.<br>• Sign language interpreter. | Can the learner:<br>a) Explain health and immunity, mention types of immunity and their importance and the factors which affect body immunity? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 2.2.2 Infections and diseases. | The learner should be able to:-<br>1. Explain the meaning of infections and diseases.<br>2. Mention common infections and diseases, their causes, symptoms, ways of transmission, and effects. | i) Learners to make self study on infections and diseases.<br>ii) Learners to visit a nearby health centre for clarifications on infections and diseases from the health workers orally/sign language. | • Journals in print/braille<br>• Modules in print/braille prepared for learners.<br>• Sign language interpreter. | Can the learner explain the meaning of infections and diseases and mention common infections and diseases? | | |
| | | 2.2.3 Communicable and non-communicable diseases. | The learner should be able to:-<br>1. Give meaning of communicable and non communicable, pandemic, epidemic and endemic diseases.<br>2. Explain the mode of transmission and control measures of, pandemic, epidemic and endemic diseases. | i) Learners to make self study on various sources on communicable and non communicable, pandemic, epidemic and endemic diseases.<br>ii) Learner make visit to health centre for more study on communicable and non communicable, pandemic, epidemic and endemic diseases. | • Print/braille text on case studies on infections and diseases.<br>• Print/tactile pictures of different people suffering from common infections and diseases. | Can the learner give meaning and explain communicable and non communicable diseases with their mode of transmission and control? | | |
| | | 2.2.4. HIV/AIDS, STDs and STIs. | The learner should be able to:-<br>1. Explain and differentiate the terms HIV/AIDS, STDs and STIs.<br>2. Explain the cause, transmission, symptoms and effects of HIV/AIDS, STDs and STIs.<br>3. Outline the prevention and control measures of HIV/AIDS, STDs and STIs. | i) Learner to make self study on various sources on HIV/AIDS, STDs and STIs.<br>ii) Using questions the facilitator to guide the learners to explain cause, transmission, symptoms, effects, and prevention and control measures of HIV/AIDS, STDs and STIs. | • Printed/braille pamphlets<br>• Printed/braille brochures<br>• Tactile charts<br>• Radios<br>• Pictures of Tactile people with HIV/AIDS, STDs and STIs.<br>• Tactile pictures. | Can the learner explain and differentiate the terms HIV/AIDS. STIs and STDs, their causes transmission, symptoms and effects? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 2.2.5. Management of HIV/AIDS and STIs. | The learner should be able to:-<br>1. Explain life skills and ways of avoiding risky situations, risky behaviour and practices.<br>2. Outline the importance of management of STIs and opportunistic diseases of HIV/AIDS. | i) Learners to make self study on various sources on HIV/AIDS, STIs, risky situations, risky behaviour and practices.<br>ii) Using questions the facilitator to guide learners to make studies and discussions on HIV/AIDS, STIs, risky situations, risky behaviour and practices. | • Magazines printed/braille<br>• Brochures, pamphlets printed/braille fliers.<br><br>On ways of avoiding risky situations, risky behaviour and practices.<br>• Sign language interpreter<br>• Sign language dictionary | Can the learner<br>a) Explain life skills and ways of avoiding risky situations, risky behaviours and practices?<br><br>b) Outline the importance of management of STIs and opportunistic diseases of HIV/AIDS? | | |
| | | 2.2.6. Care and support of people living with HIV/AIDS (PLWHA). | The learner should be able to:-<br>1. Explain the importance of providing care to people living with HIV/AIDS (PLWHA) in the family and community.<br>2. Outline the effects of stigma and discrimination to individual, family and the community.<br>3. Mention necessary care and support to PLWHA in the family and community. | i) Learners to make self study on print/braille text from various sources on care and support for people living with HIV/AIDS.<br>ii) Learners to visit a nearby health centre to learn more on care and support of PLWHA. | • Printed/brailled Pamphlets/ brochures on stigmatization and discrimination of people living with HIV/AIDS.<br>• Printed/tactile manuals on care and support for PLWHA.<br>• Sign | Can the learner:-<br>a) Explain the importance of providing care to PLWHA?<br><br>b) Outline the effects of stigma and discrimination to individual, family and community as well as necessary care to PLWHA? | | |
| 3. CELL BIOLOGY AND CLASSIFI-CATION | 3.1. Cell Structure and Organization | 3.1.1. The cell concept | The learner should be able to:-<br>1. Explain the concept of a cell and the characteristics of a cell.<br>2. Draw a well labelled diagram of a cell and explain the roles of each part.<br>3. State the cell theory and explain the main ideas of the cell theory. | Learners to make self study from various sources on the cell concept. | • Printed/tactile chart showing plant and animal cells. | Can the learner:-<br>a) Explain, draw and label the cell?<br><br>b) State the cell theory and explain the main ideas of the cell theory? | | 15 hrs |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 3.1.2. Cell differentiation. | The learner should be able to:<br>1. Discuss the importance of cell differentiation and the formation of tissues, organs and body systems. | Learners to make self study on cell differentiation by observing listening/watching tissues, organs and systems from different organisms. | • Printed/tactile charts of different types of plants and animal tissues, organs and systems.<br>• Printed/tactile diagrams. | Can the learner discuss the importance of cell differentiation and the formation of tissues, organs and body systems? | | |
| | 3.2. Classification of Living Organisms | 3.2.1. The concept of classification | The learner should be able to:<br>1. Explain the concept of classification and its importance.<br>2. Explain the types of classification and outline the merits and demerits of each system.<br>3. Group of organisms according to their similarities and differences. | i) Learners to study on classification from different sources.<br>ii) Learners to collect varieties of organisms and group them according to their similarities and differences.<br>iii) Learners to carry out a practical exercise on classification of organisms basing on artificial and natural classification system. | • Variety of living organisms.<br>• Printed/tactile charts/pictures of variety of living things and non living things.<br>• Sign language dictionary. | Can the learner<br>a) Explain the concept of classification its types, importance merits and demerits?<br>b) Group organisms according to their similarities and differences? | | 40 hrs |
| | | 3.2.2. Major groups of living things. (*Monera, Protoctista, Fungi, Plantae, Animalia*) | The learner should be able to:-<br>1. Mention major groups of living things and explain the general and distinctive features for each group.<br>2. State the major division/phyla for each group and explain the general and distinctive feature for each.<br>3. Describe the structure of represented members for each division/phyla. | i) Learners to study on classification from different sources.<br>ii) Learners to collect variety of living animals/plants.<br>iii) Learners to classify organisms to their respective division/phyla.<br>iv) Facilitator to guide learners using questions to classify or place organisms in their respective groups. | • Variety of living organisms<br>• Tactile/charts/ pictures of variety of living things.<br>• Representative organisms of each group of living organisms. | Can the learner<br>a) Mention major groups of organisms and explain their distinguishing features?<br>b) State the major phyla /division for each group?<br>c) Describe the structure of representative member for the groups? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 3.2.3. Viruses | The learner should be able to:-<br>1. Explain general and distinctive features of viruses.<br>2. Outline the impact of viruses in human life.<br>3. Outline the advantages and disadvantages of viruses. | i) Learners to study variety of materials on viruses.<br>ii) Facilitator to provide printed/tactile pictures and diagrams of viruses<br>iii) Learner to visualize/feel took printed/tactile charts/ micrographs of viruses and outline their unique features. | • Print/brailled relevant books<br>• Printed/tactile Charts and Micrographs. | Can the learner<br>a) Explain the general and distinctive features of viruses?<br>b) Outline its impact to human advantages and disadvantages? | | |
| 4. NUTRITION, TRANSPORT OF MATERIALS AND NATURE. | 4.1. Nutrition | 4.1.1. Food nutrients. | Learner should be able to:<br>1. Explain the meaning of nutrition and nutrients.<br>2. State with examples the types of food nutrients, their properties and functions in the human body.<br>3. Carry out food tests for reducing sugar, non reducing sugar, starch, proteins and lipids. | i) Facilitator to guide learners to discuss on the meaning of nutrition and nutrients.<br>ii) Facilitator to guide learners to discuss the importance of nutrition in living organisms.<br>iii) Learners to carry out/ describe a food test.<br>iv) Facilitator to guide learners to carry out /describe experiment. | • Variety of food substances labeled in print/Braille.<br>• Braille<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Thermform machine. | Can the learner<br>a) Explain nutrition and nutrients.<br>b) Explain the properties and functions to human body of various types of food?<br>c) Carry out /describe food test experiment? | 3 hrs | 30 hrs |
| | | 4.1.2. Nutrition in plants. | The leaner should be able to:<br>1. Explain the meaning of photosynthesis and raw materials and condition necessary for the process.<br>2. Carry out experiment on conditions necessary for photosynthesis.<br>3. State types of storage organs in plants<br>4. Explain the role of essential elements in plant nutrition. | i) Learners to study various sources on photosynthesis.<br>ii) Learners to carry out/ describe experiment on conditions necessary for photosynthesis.<br>iii) Facilitator to guide the learner using questions to discuss on photosynthesis.<br>iv) Learners to observe/ listen/ touch/watch storage organs of varieties of plants in the localities. | Labeled in print/braille<br>• Variety of plants<br>• Cassava<br>• Maize<br>• Carrot<br>• Bean seeds<br>• Groundnuts<br>• Others.<br>• Brailler<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Thermoform machine | Can the learner<br>a) Explain the meaning, raw materials, and conditions of photosynthesis?<br>b) Carry out /describe photosynthesis experiments?<br>c) State types of storage organs in plants and the essential elements for plant nutrition? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 4.1.3. Food processing, preservation and storage. | The learner should be able to:<br>1. State with examples different methods of processing, preservation and storage.<br>2. Investigate how foods are preserved, processed or stored in the community. | i) The learner to investigate the methods of preservation, storage and processing food in the community.<br>ii) Learners to study on various journals on food processing, preservation and storage. | • Variety of food substances labelled in printed/Braille.<br>• Photographs/tactile pictures on food processing. preservation and storage.<br>• Samples of raw foods.<br>• Samples of processed and preserved foods.<br>• Brailled journals on food. processing, preservation and storage.<br>• Sign language interpreter. | Can the learner<br>a) State with examples different methods of processing, preservation and storage?<br>b) Investigate on how foods are locally preserved, processed and stored? | | |
| | | 4.1.4. Nutrition in human. | The learner should be able to:-<br>1. Explain the meaning of balanced diet, its components, quality and quantity in relation to body status.<br>2. Plan balanced diet to different groups of people e.g. children, expectant/lactating mothers, old, the sick, sedentary employees and people who use extra energy.<br>3. Outline causes, effects, symptoms and preventive measures of nutritional disorders e.g. kwashiorkor, marasmus, beriberi, night blindness and scurvy.<br>4. Explain the meaning of digestion and the roles of different parts of the digestive system and adaptations to their functions. | i) Learners to make self studies on nutrition in human.<br>ii) Facilitator to guide learners through questions and answers.<br>iii) Learners to discuss in groups on the importance of balanced diet in human.<br>iv) Learners to prepare a balanced diet. | • Variety of food substances.<br>• Printed/brailled/charts/diagrams of digestive system.<br>• Article from journals on digestion processes in human.<br>• Printed/tactile charts/photographs showing common disorders/diseases of the digestive system. | Can the learner<br>a) Explain balanced diet and plan it for different groups of people?<br>b) Outline nutritional disorders their causes, effects, symptoms and preventive measures?<br>c) Explain the meaning of digestion and the roles of different parts of the digestive system and adaptations to their functions? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | 4.2. Transport of Materials in Organisms | 4.2.1. General concept of transport, osmosis, and diffusion. | The learner should be able to:-<br>1. Explain the meaning and importance of transport in organisms.<br>2. Explain the roles of osmosis, diffusion, and mass flow in the movement of materials in and out of the cell.<br>3. Explain plasmolysis and turgidity. | i) Learners to make self studies on transport in organisms.<br>ii) Carry out/describe and experiment on osmosis using potatoes.<br>iii) Facilitator to guide learners to carry out/describe experiment on osmosis and diffusion, | • Printed /tactile charts/diagrams on osmosis and diffusion.<br>• Potatoes<br>• Salts<br>• Water<br>• Perfumes<br>• Pawpaw<br>• Heat source<br>• Variety of flowers<br>• Laundry blue. | Can the learner<br>a) Explain meaning and importance of transport in organisms?<br>b) Explain the roles of osmosis, diffusion, mass flow, plasmolysis and turgidity? | | 20 hrs |
| | | 4.2.2. Transport in plants. | The learner should be able to:-<br>1. Describe the vascular tissues in plants and their functions.<br>2. Describe the mechanism of absorption and movement of water, mineral salts and produced foods in plants. | i) Learners to make self studies on transport in plants.<br>ii) Facilitator to guide the learner through questions and answers.<br>iii) Learners to draw and label the distribution of vascular system in monocoty and dicoty roots, stems, and leaves. | • Braillers<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Thermoform machine.<br>• Sign language Dictionary.<br>• Diagrams of vascular system in roots, stem, and leaf of flowering plants.<br>• Diagrams of roots showing root hairs. | Can the learner<br>a) Describe the vascular tissues in plants and their functions.<br>b) Explain the role of xylem, phloem and root hair in transport of food, water, and minerals? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 4.2.3. Transport in animals (human as an example). | The learner should be able to:-<br>1. Draw a well labeled diagram of mammalian heart and their functions.<br>2. Describe the structure of arteries, capillaries and veins.<br>3. Describe the functions and adaptation of the three named blood vessels to their roles.<br>4. Describe the circulatory system in human and their general defects (BPs, and cholesterol effects. | i) Learners to draw internal and external diagrams of the mammalian heart.<br>ii) Learners to observe/listen/watch the heart of a slaughtered animal.<br>iii) Facilitator to provide charts and diagrams/photographs of the heart and blood vessels.<br>iv) Facilitator to guide the learner through questions and answers to make self studies. | • Printed/tactile diagram of the human heart and the circulatory system.<br>• Printed/tactile charts showing parts of the human heart.<br>• Braille labeled<br>• Heart of a slaughtered animal.<br>• Brailler<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Thermoform machines.<br>• Sign language Dictionary. | Can the learner<br>a) Draw a well labeled heart diagram?<br>b) Describe the structure of artery, vein, and capillaries and state their adaptation to the functions they perform?<br>c) Describe the circulatory system in human and their defects? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 4.2.4. Blood groups and blood transfusion. | The learner should be able to:<br>1. Explain the concept of blood groups and blood transfusion.<br>2. Outline the relationship between blood groups and blood transfusion.<br>3. Explain the advantages and disadvantages of blood transfusion and the precaution to be taken during blood transfusion. | i) Facilitator to guide learners through questions to explain the advantages and disadvantages of blood transfusion.<br>ii) Learner to make a self study on blood groups and blood transfusion.<br>iii) Facilitator to guide learners through questions to revisit the major components of blood in relation to blood groups. | • Printed/tactile charts and tables showing blood groups and their respective antigen and antibodies. | Can the learner<br>a) Explain the concept of blood groups and blood transfusion and their relationship?<br>b) Explain the advantages and disadvantages of blood transfusion and the precaution to be taken during blood transfusion? | | |
| | | 4.2.5. The lymphatic system. | The learner should be able to :<br>1. Explain the concept of lymphatic system.<br>2. Outline the components of the human lymphatic system.<br>3. Explain the role of the lymphatic system in transport of materials in human body. | i) Learners to make a self study on the lymphatic system.<br>ii) Learners to draw the well labeled diagram of the human lymphatic system.<br>iii) Facilitator to guide learners using question to describe the parts and functions of the lymphatic system.<br>iv) Learners guided with questions to describe the structure and functions of the lymphatic system. | • Tactile Charts on lymphatic system of the human.<br>• Tactile diagram of human lymphatic system. | Can the learner<br>a) Explain the concept of lymphatic system and its components?<br>b) Explain the role of the lymphatic system in transport of materials in human body? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE/ | PRIVATE STUDY |
| | 4.3. Balance of nature. | 4.3.1. The natural environment. | The learner should be able to:<br>1. Explain the concept of natural environment.<br>2. Describe biotic and abiotic components of the environment.<br>3. Explain the importance of the natural environment. | i) Learners to make self study of the natural environment and the biotic and abiotic components of the environment. | • Natural habitats of different types (pond, stream, shrub, rock hill and wood land.<br>• Organisms in their natural habitat. | Can the learner<br>(a) Explain natural environment and the biotic and abiotic components?<br>(b). Explain the importance of the natural environment? | | 8 hrs |
| | | 4.3.2. Interaction of organisms in the environment. | The learner should be able to.<br>1. Identify ways in which organisms interact with the non living components of the environment.<br>2. Explain the interaction of organisms among themselves. | i) Learners to make a visit to observe how living things interact with the non living environment.<br>ii) Facilitator to guide learners using questions to visit their environment to observe/watch/listen how organisms interact with the non- living component of the environment. | • Natural habitats of different types (pond, stream, shrub, rock hill and wood land.<br>• Organisms in their natural habitat.<br>• Photographs/tactile diagrams showing different environment surround of their learners locality.<br>• Orientation and mobility specialist.<br>• Sign language interpreter. | Can the learner:-<br>(a) Identify ways in which organisms interact with the non living components of the environment?<br>(b) Explain the interaction of organisms among themselves? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 4.3.3. Food chain and food web. | The learner should be able to:<br>1. Explain the meaning of food chain and food web and their components.<br>2. Distinguish between food chain and food web.<br>3. Construct diagrammatic representation of a food chain and food web and explain their significance in real life situation. | i) Learners to make self study and construct diagrammatic representation of food web and food chain.<br>ii) Using questions the facilitator to guide learners to discuss in groups the food chain and food web. | • Natural habitats of different types (pond, stream, shrub, rock hill and wood land.<br>• Organisms in their natural habitat.<br>• Photographs/tactile pictures/diagrams showing different environment.<br>• Printed/tactile charts/pictures/ diagrams showing feeding relationship among organisms. | Can the learner:<br>a) Explain the meaning of food chain and food web and their components as well as distinguishing them?<br>b) Construct diagrammatic representation of a food chain and food web and explain their significance in real life situation? | | |
| 5.0 GASEOUS EXCHANGE AND RESPIRATION | 5.1. Gaseous Exchange. | 5.1.1. The concept of gaseous exchange. | The learner should be able to:<br>1. Explain the concept of gaseous exchange.<br>2. Identify organs responsible with gaseous exchange in living organisms. | Learners to make self study on the concept of gaseous exchange and identify parts responsible for the process. | • Printed/tactile charts/diagram showing parts of the respiratory system involved in gaseous exchange. | Can the learner explain the concept of gaseous exchange in living organisms and the organs responsible? | | 8 hrs |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 4.3.3. Food chain and food web. | The learner should be able to:<br>1. Explain the meaning of food chain and food web and their components.<br>2. Distinguish between food chain and food web.<br>3. Construct diagrammatic representation of a food chain and food web and explain their significance in real life situation. | i) Learners to make self study and construct diagrammatic representation of food web and food chain.<br>ii) Using questions the facilitator to guide learners to discuss in groups the food chain and food web. | • Natural habitats of different types (pond, stream, shrub, rock hill and wood land.<br>• Organisms in their natural habitat.<br>• Photographs/tactile pictures/diagrams showing different environment.<br>• Printed/tactile charts/pictures/ diagrams showing feeding relationship among organisms. | Can the learner:<br>a) Explain the meaning of food chain and food web and their components as well as distinguishing them?<br>b) Construct diagrammatic representation of a food chain and food web and explain their significance in real life situation? | | |
| 5.0 GASEOUS EXCHANGE AND RESPIRATION | 5.1. Gaseous Exchange. | 5.1.1. The concept of gaseous exchange. | The learner should be able to:<br>1. Explain the concept of gaseous exchange.<br>2. Identify organs responsible with gaseous exchange in living organisms. | Learners to make self study on the concept of gaseous exchange and identify parts responsible for the process. | • Printed/tactile charts/diagram showing parts of the respiratory system involved in gaseous exchange. | Can the learner explain the concept of gaseous exchange in living organisms and the organs responsible? | | 8 hrs |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 5.1.2. Gaseous exchange in mammals. | The learner should be able to:<br>1. Identify parts of respiratory system and explain how each is adapted to its roles.<br>2. Describe the mechanism of gaseous exchange in mammals and the factors affecting gaseous exchange in mammals. | i) Learners to make self study on gaseous exchange in mammals.<br>ii) Facilitator to guide learners with question and answers to discuss parts of respiratory system and the mechanism of the process. | • Printed/tactile charts/ diagram showing alveoli of lungs.<br>• Printed/tactile charts/diagram showing respiratory system.<br>• Printed/tactile diagrams pictures/ charts showing gaseous exchange in mammals. | Can the learner<br>a) Identify parts of respiratory system and explain how each is adapted to its roles?<br>b) Describe the mechanism of gaseous exchange in mammals and the factors affecting gaseous exchange in mammals? | | |
| | | 5.1.3. Gaseous exchange in plants | The learner should be able to:<br>1. Identify parts responsible for gaseous exchange in plants and how the process takes place.<br>2. Explain the importance of gaseous exchange in plants. | i) Learners to make self study on gaseous exchange in plants.<br>ii) Facilitator to guide learners through questions to discuss gaseous exchange in plants. | • Printed/tactile charts/diagrams showing the process of gaseous exchange in plants<br>• Hand lens<br>• Plant leaves and shoots. | Can the learner explain the importance of gaseous exchange in plants and parts responsible? | | |

# STAGE II

## OBJECTIVES

After completing Biology stage II, the learner should be able to:

1. Think critically and logically, interpret and solve Biology problems.
2. Use Biology language in expressing and defining Biological ideas.
3. Sit for various examinations including National Form Four Examinations
4. Apply Biology knowledge and skills in your daily activities and other disciplines.
5. Able to use Biology knowledge and skills towards studying the next stage (stage III)

# STAGE II: FORM III AND IV EQUIVALENT

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | 5.2. Respiration. | 5.2.1. The Concept of respiration and type of respiration. | The learner should be able to:<br>1. Explain the concept of respiration.<br>2. Explain the types of respiration.<br>3. Outline the mechanism of aerobic and anaerobic respiration and their end products.<br>4. Carry out experiment on aerobic and anaerobic respiration and the application of each. | i) Learners to make self study on Respiration.<br>ii) Facilitator to guide learners through question to discuss on Respiration.<br>iii) Learner to carry out /describe experiment on aerobic and anaerobic types of respiration. | • Printed/tactile charts/diagrams on aerobic and anaerobic respiration.<br>• Printed/tactile charts on end products of anaerobic respiration. | Can the learner<br>a) Explain the concept of respiration, its types, their mechanisms and their end products?<br>b) Carry out experiment on aerobic and anaerobic respiration and the application of each? | 3 hrs | 8 hrs |
| | | 5.2.2. Infections, diseases and disorders of respiratory system. | The learner should be able to:<br>1. Mention common airborne infections and diseases which affect the respiratory system and explain the causes, symptoms, and their effects.<br>2. Suggest ways of prevention and control of infections and diseases of the respiratory system.<br>3. Mention common disorders of respiratory system and explain the causes, symptoms, and their effects.<br>4. Suggest ways of prevention and control of disorders of the respiratory system.<br>5. Relate disorders of the respiratory system and HIV/AIDS. | i) Learners to visit a nearby health centre to make a case study on common infections, diseases and disorders of the respiratory system.<br>ii) Learners to make self study on the infections, diseases and disorders of respiratory system.<br>iii) Facilitator to guide learners through question to discuss on the infections, diseases and disorders of respiratory system. | • Orientation and mobility specialist<br>• Sign language interpreter<br>• Printed/brailled extract/texts from journals on common airborne infections<br>• Printed/tactile extract/texts on preventive and control measures of diseases and infections of the respiratory system.<br>• Printed/tactile charts/diagrams showing disorders of respiratory system. | Can the learner<br>a) Mention common airborne infections and diseases affecting respiratory system (RS) their causes, symptoms, and their effects prevention and control ways?<br>b) Mention common disorders of the RS their causes, symptoms, and their effects, prevention and control ways and their relation with HIV/AIDS? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| 6.0 MOVEMENT, COORDINA-TION AND REGULATION | 6.1. Movement | 6.1.1. General concept. | The learner should be able to:<br>1. Explain the meaning and importance of movement in organisms.<br>2. Outline the differences between movement and locomotion. | i) Learners to make self study on movement in organisms.<br>ii) Facilitator to guide learners through question to discuss on movement and locomotion. | • Transcribed study materials.<br>• Variety of organisms such as insects, fish, and mouse.<br>• Printed/tactile charts on locomotion/ movement of different organisms. | Can the learner:<br>a) Explain the meaning and importance of movement in organisms?<br>b) Outline the differences between movement and locomotion? | 3 hrs | 10 hrs |
| | | 6.1.2. Movement of the human body. | The learner should be able to:<br>1. Describe the structure of the human skeleton system and its functions.<br>2. Identify different types of joints in the human skeleton and their roles. | i) Learners to make self study on movement in organisms.<br>ii) Facilitator to guide learners through questions to discuss on movement of human body. | • Models of human skeleton<br>• Printed/tactile pictures/diagrams of human skeleton.<br>• Transcribed study materials. | Can the learner:<br>a) Describe the structure of the human skeleton system and its functions?<br>b) Identify different types of joints in the human skeleton and their roles? | | |
| | | 6.1.3. The muscles and movement. | The learner should be able to:<br>1. Mention different types of muscles, their functions and adaptative features.<br>2. Differentiate smooth, skeletal and cardiac muscles. | i). Learners to make self study of movement in organisms.<br>ii). Facilitator to guide learners through questions to discuss the role of muscle in movements. | • Printed /tactile Models/charts/ diagrams pictures of different types of muscles.<br>• Printed/tactile charts<br>• Tactile diagrams. | Can the learner:<br>a) Mention different types of muscles, their functions and adaptative features?<br>b) Differentiate smooth, skeletal and cardiac muscles? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | 6.2 Coordination | 6.2.1 General concept | The learner should be able to:<br>Explain the meaning and importance of coordination. | Learners to make self study on general concept of coordination. | Relevant printed/brailled text/ module/study materials | Can the learner explain the meaning and importance of coordination? | | 30 hrs |
| | | 6.2.2 Nervous coordination in human | The learner should be able to:<br>1. Explain the role and structure of motor, sensory and relay neurons.<br>2. Explain adaptations of each neuron to its role.<br>3. Describe the structure and functions of the parts of the central nervous system (CNS) – (Brain and spinal cord).<br>4. Explain the meaning of peripheral nervous system (PNS) and list its components.<br>5. Draw a spinal cord and show pathway of reflex action.<br>6. Distinguish between simple and conditional reflexes. | i) Learners to make self study on nervous coordination in human.<br>ii) Facilitator to guide learners through questions to discuss on nervous coordination in human.<br>iii) Learners to make and describe simple experiment on reflex action.<br>iv) Learners to draw and label the structure of spinal cord and brain.<br>v) Learners to observe/ listen/watch/touch charts/photographs of the peripheral nervous system. | • Printed/tactile diagrams/charts showing nerve cells (Motor, Sensory and Relay).<br>• Real hot objects<br>• Printed/tactile charts of the central Nervous System.<br>• Tactile diagrams/ photographs showing nerve cells Spinal cord and brain.<br>• Tactile diagrams of the peripheral venous system. | Can the learner:<br>a) Explain the types of neurons and the adaptations to their roles?<br>b) Describe the CNS and PNS and their components?<br>c) Explain the reflex action?<br>d) Distinguish simple and conditional reflexes? | | |
| | | 6.2.3 Sense of organs. | The learner should be able to:-<br>1. Explain the meaning of sense organs and stimuli for each.<br>2. Identify and describe the functions of the parts of sense organs i.e. skin, tongue, nose, eye and ear.<br>3. Explain how each organ works. | i) Learners to make self study on the sense organs.<br>ii) Learners to draw diagrams of the five sense organs (Nose, Eye, Skin, Ear, Tongue.) | • Tactile diagrams/photographs of the sense organs.<br>• Mirror<br>• Small living mammals e.g. mouse.<br>• Brailler<br>• Manilla paper<br>• Braillon paper<br>• Thermoform machine<br>• Typewriters | Can the learner:<br>a) Explain the meaning of sense organs and stimuli for each?<br>b) Describe the functions of the parts of sense organs i.e. skin, tongue, nose, eye and ear?<br>c) Explain how each organ works? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 6.2.4 Drug and drug abuse. | The learner should be able to:<br>1. Explain the meaning of drug and drug abuse and name the types.<br>2. Explain the causes and effects of drug abuse. | i) Learners to make self study on drug and drug abuse.<br>ii) Learners to visit nearby health centre to study the cause and effects of drug abuse. | • Printed/tactile Posters of drug addicts/users.<br>• Real samples of drugs.<br>• Transcribed study materials on drug and drug abuse.<br>• Printed/tactile Posters/pictures/ diagrams showing samples of illegal drugs. | Can the learner:<br>a) Explain the meaning of drug and drug abuse and name the types?<br>b) Explain the causes and effects of drug abuse? | | |
| | | 6.2.5 Hormonal coordination in animals. | The learner should be able to:-<br>1. Identify endocrine glands and their locations.<br>2. Describe the hormones secreted by each endocrine gland and their roles. | i) Learners to make self study on hormonal coordination in animals.<br>ii) Facilitator to guide learners through questions to study hormones and their roles in the body of animals. | • Printed/tactile charts/diagrams of the endocrine system.<br>• Transcribed/ printed study materials on hormonal coordination in animals. | Can the learner:<br>a) Identify endocrine glands and their locations?<br>b) Describe the hormones secreted by each endocrine gland and their roles? | | |
| | | 6.2.6 Response in plants. | The learner should be able to:-<br>1. List and define types of tropic movements and their stimuli.<br>2. Explain the effects and significance of light, water, gravity and chemicals on direction of plant growth. | i) Learners to make self study on coordination in plants.<br>ii) Facilitator to guide learners to carry out/describe experiment to investigate the effect of tropic and nastic in plants and record the findings<br>iii) Learners to outline significance of tropisms in plant growth. | • Printed/Tactile charts showing examples of tropic responses.<br>• Real potted plants subjects all-round light and unidirectional light.<br>• Real cotton wool.<br>• Real young plant. | Can the learner<br>a) List and define types of tropic movements and their stimuli.<br>b) Explain the effects and significance of light, water, gravity and chemicals on direction of plant growth? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | 6.3. Excretion Regulation | 6.3.1. Excretion in human. | The learner should be able to:<br>1. Explain the meaning and importance of excretion.<br>2. Name the excretory organs and their products.<br>3. Describe the structure of the human urinary system and its role.<br>4. Explain the process of urine formation.<br>5. Outline the causes, symptoms and effects of complications/ disorders of the urinary system such as kidney failure and kidney stones. | i) Learners to make self study on excretion in human and the complication/disorders of the urinary system.<br>ii) Facilitator through questions to guide learners to discuss the mechanism of excretion.<br>iii) Learners to draw and label the structure of the human excretory system (kidney, ureter, urinary bladder, urethra).<br>iv) Learners to identify structure of the body.<br>v) Learners to label structures of human excretory system from a given tactile diagram. | • Printed/tactile charts showing various types of excretory products and their importance.<br>• Printed/tactile chart showing the tabulation of causes, symptoms and effects of the complications and disorders of the urinary system.<br>• Brailler (perkin)<br>• Brailler Kit<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Thermoform machine. | Can the learner:<br>a) Describe the complications/<br>b) Disorders of the urinary system?<br>c) Describe the structure of the human urinary system, its role and the processes of urine formation?<br>d) Explain excretion and name the excretory organs and their products? | | 8 hrs |
| | | 6.3.2. Excretion in plants. | The learner should be able to:<br>1. Mention types of waste products eliminated by plants and their importance. | Learners to make self study on excretion in plants. | • Printed/ tactile chart showing various plants and their waste products. | Can the learner mention waste products eliminated by plants and their importance? | | |
| | | 6.3.3 Regulation in mammals | The learner should be able to:-<br>1. Explain different ways of increasing and decreasing body temperature.<br>2. Describe the mechanisms for sugar, salt and water balance in the human body.<br>3. Outline the effects of high and low blood sugar lever in the body. | i) Learner to make self study on regulation in mammals.<br>ii) Facilitator to guide learners through questions to study on regulation in mammals. | • Printed/tactile chart showing the process of regulation in animals.<br>• Printed/brailled extracts/texts on various types of regulation.<br>• Printed/tactile charts/pictures/ diagrams showing various types of regulation in mammals. | Can the learner:<br>a) Describe the mechanisms of sugar, salt and water balance in human and effects of high and lower blood sugar level?<br>b) Explain ways of increasing and decreasing body temperature in different organisms? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| 7. REPRODUCTION | 7.1. Reproduction | 7.1.1 Concept of reproduction. | The learner should be able to:-<br>1. Explain meaning and importance of reproduction.<br>2. Mention the types of reproduction and their differences.<br>3. Explain the advantages and disadvantages of sexual and asexual reproduction. | i) Learners to make self study on meaning of reproduction, importance of reproduction asexual and sexual reproduction and its advantages and disadvantages. | • Variety of organisms.<br>• Picture/photographs of plants that reproduce by seeds or vegetatively.<br>• Tactile picture/ diagram with description plants that produce seeds. | Can the learner:<br>a) Explain the importance and types of reproduction?<br>b) Explain the advantages and disadvantages of sexual and asexual reproduction? | 3 hrs | 10 hrs |
| | | 7.1.2 Gamete formation | The learner should be able to:-<br>1. Identify and explain different stages of meiosis.<br>2. Outline the formation of male and female gametes. | i) Learners to make self study on meiosis as source of gamete formation.<br>ii) Learners to draw and label the diagrams male and female gametes. | • Printed/tactile diagrams/charts pictures/photographs showing stages of meiosis.<br>• Print/tactile pictures/charts/diagrams showing the formation and liberation of gametes.<br>• Brailler kit<br>• Perkin brailler<br>• Thermoform machine<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Sign language dictionary | Can the learner:<br>Outline different stages of meiosis and gametes formation in male and female? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | | | | | | FACE TO FACE | PRIVATE STUDY |
| | | 7.1.3 Human reproduction | The learner should be able to:<br>1. Describe the structures of male and female reproductive systems and their functions.<br>2. Outline the events occurring during menstrual cycle.<br>3. Explain the process of fertilization and the development of foetus/embryo.<br>4. Outline the roles of the placenta, amniotic fluid, and the uterus in the development of the foetus/embryo.<br>5. Outline the process of child birth.<br>6. Explain the meaning of artificial insemination and test tube babies. | i) Learners to make self study on human reproduction.<br>ii) Facilitator to guide learners through questions and answers to study on reproduction in human. | • Printed/tactile pictures/charts/ diagrams photographs, and pictures showing structures of male and female reproductive system.<br>• Printed/ tactile Charts on fertilization.<br>• Printed/tactile Charts showing depicting artificial insemination. | Can the learner:<br>a) Describe the male and female reproductive system?<br>b) Explain the menstrual cycle, fertilization, and foetus development?<br>c) Explain the role of placenta, amniotic fluid, and the uterus for foetus development?<br>d) Explain child birth artificial insemination and test tube babies? | | |
| | | 7.1.4. Multiple pregnancies. | The learner should be able to:<br>1. Give the meaning of multiple pregnancies.<br>2. Explain the causes of multiple pregnancies.<br>3. Explain twins formation and their differences. | Learners to make self study on multiple pregnancies and twins formation. | • Printed/tactile charts/pictures on multiple pregnancies.<br>• Transcribed study material. | Can the learner:<br>Explain multiple pregnancies, its causes and twins formation? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | 7.1.5 Disorders and complications of reproductive system. | The learner should be able to:-<br>1. Name and explain causes, effects and remedies of the reproductive system disorders and complications.<br>2. Outline and explain complications of reproductive system disorders.<br>3. Outline and explain complications of reproductive system leading to abortion still birth, ectopia pregnancies and miscarriages. | i) Learners to make self study on disorders of reproductive system and explain complications of reproductive system.<br>ii) Facilitator to guide learners using questions to discuss the disorders and complication of the reproductive system. | • Printed tactile charts and tactile pictures/ diagrams Documents on the disorders and complication of the reproductive system.<br>• Printed/ tactile charts showing the causes of disorders of the human reproductive system.<br>• Print into braille documents on disorders and complication of reproductive system. | Can the learner:<br>a) Explain causes of effects and remedies of reproductive system disorders?<br>b) Explain reproductive system complications in relation to abortion, stillbirth, ectopia pregnancies and miscarriage? | | |
| | | 7.1.6 Infections and diseases of reproductive tract. | The learner should be able to:-<br>1. Define Reproductive Tract infection (RTIs) and Diseases (RTDS), their examples and effects.<br>2. Outline the causes, symptoms and prevention of RTIs and RTDs.<br>3. Outline socio-cultural practices and life style which favour prevalence of RTIs and RTDs in the society. | i) Learners to make self study on infections and diseases of the reproductive tract | • Printed/tactile Diagrams/pictures showing people with STDs and STIs.<br>• Transcribed description of pictures/diagrams showing people with STD and STIs. | Can the learner:<br>a) Explain the reproductive Track Infections (RTIs) and diseases (RTDs)? Its causes, symptoms and prevention of RTIs and RTDs?<br>b) Outline socio-cultural practice and life style, which favour the spread of RTIs and RTDs? | | |

| MODULE | TOPIC | SUB-TOPIC | SPECIFIC OBJECTIVES | LEARNING/TEACHING STRATEGIES | LEARNING/TEACHING MATERIALS | ASSESSMENT | DURATION | |
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| | | 7.1.7 Sexuality, sexual health and responsible behaviour. | The learner should be able to:-<br>1. Explain the meaning of sexuality, sexual behaviours, responsible and irresponsible sexual behaviours.<br>2. Explain the consequences of irresponsible sexual behaviour and ways of prevention. | Learners to make self study on sexuality sexual health and responsible. | • Printed /tactile pictures, charts photographs, brochures, fliers, radio video tapes and texts depicting cases of sexuality and sexual behaviour.<br>• Printed/brailled text extract from various sources on sexuality, sexual health and responsible behaviour. | Can the learner:<br>a) Explain the meaning of sexuality, sexual behaviour, responsible and irresponsible sexual behaviour?<br>b) Explain the consequences of irresponsible sexual behaviour and ways of prevention? | | |
| | | 7.1.8 Family planning. | The learner should be able to:-<br>1. Explain meaning and importance of family planning.<br>2. List down different methods of family planning; their advantages and disadvantages.<br>3. Explain importance of maternal and child care and factors which promote their welfare and good health. | i) Learners to make self study on family planning.<br>ii) Learners to discuss the concept of maternal and childcare and their importance. | • Printed/tactile diagrams Pictures of various family planning devices.<br>• Printed/transcribed texts on merits and demerits of family planning.<br>• Photographs of real powdered milk.<br>• Pictures of contraceptives pictures/ photographs of women breast feeding<br>• Real objects for devices mentioned above. | Can the learner<br>a) Explain meaning and importance of family planning and list different methods used with their advantages and disadvantages?<br>b) Explain the importance of maternal and child care and factor which promote them? | | |
| | | 7.1.9. Reproduction in plants. | The learner should be able to:<br>1. Describe the structure of the flower.<br>2. Explain the term pollination its types and agents.<br>3. Explain the concept of fertilization in flowering plants. | i) Learners to make self study on reproduction in plants.<br>ii) Learner to observe/listen/watch/ touch/feel different types of flowers.<br>iii) Learner to draw a well labeled diagram of a named flower. | • Variety of natural flowers<br>• Printed /tactile charts showing fertilization in flowering plants.<br>• Printed/tactile charts showing different agents of pollination. | Can the learner draw and describe the flower and the ways pollination and fertilization takes place in flowering plants? | | |

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| 8. GROWTH AND GENETICS | 8.1. Growth | 8.1.1. Mitosis and growth. | The learner should be able to:-<br>1. Explain the concept of growth.<br>2. Mention factors which affect growth.<br>3. Explain the stages and the main events of mitosis.<br>4. State significance of mitosis in growth. | i) Learners to make self study on mitosis and growth.<br>ii) Facilitator to guide learners using questions to discuss on mitosis and growth. | • Printed/brailled/text extracted from various sources explaining the concept of growth and mitosis.<br>• Printed/tactile diagrams/pictures showing stages of mitosis. | Can the learner:<br>a) Explain the concept of growth and factors affecting it?<br>b) Explain mitosis and its significance in growth? | | 8 hrs |
| | | 8.1.2. Human postnatal growth and development | The leaner should be able to:<br>1. Describe the stages of human post-natal growth and development.<br>2. Explain physiological, psychological and behavioural changes associated with human growth and developmental stages.<br>3. Outline factors which affect the rate of physical deterioration of the human body and services required to meet the need of an individual at each stage.<br>4. Explain socio- cultural factors with adverse effects on growth and development. | i) Learners to make self study on human postnatal growth and development.<br>ii) Learners to investigate the availability accessibility and affordability of health and other social services in their local community. | • Printed/tactile Charts/diagrams of human growth curve.<br>• Printed/tactile charts/diagrams showing development stages in man.<br>• Printed tactile charts/pictures of variety of food<br>• Variety of food substances laballed in print/braille.<br>• Printed/tactile diagrams, pictures.<br>• Transcribed study material. | Can the learner:<br>a) Describe the stages of human post-natal growth and development?<br>b) Explain physiological, psychological and behavioural changes associated with human growth and developmental stages?<br>c) Outline factors which affect the rate of physical deterioration of the human body and services required to meet the need of an individual at each stage including socio-cultural factors? | | |

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| | | 8.1.3. Growth in plants. | The learner should be able to:<br>1. Give meaning of localized growth in plants.<br>2. Draw and describe the function of parts of a seed.<br>3. State and explain epigeal and hypogeal germination and factors affecting both. | i) Learners to make self study on growth in plants.<br>ii) Learners to carry out/describe an experiment on germinating seeds and observe/listen/watch the growing regions. | • Germinating seeds labelled inbraille/print<br>• Thread<br>• Ink<br>• Cotton wool<br>• Printed/brailled extract of text on changes occurring during germination.<br>• Brailler<br>• Manilla paper<br>• Braillon paper<br>• Typewriters<br>• Thermoform machines. | Can the learner:<br>a) Explain how plants grow?<br>b) Draw and describe the functions of parts of a seed?<br>c) State and explain epigeal and hypogeal germination and factors affecting them? | | |
| | 8.2 Genetics | 8.2.1 General concept of genetics and variation. | The learner should be able to:<br>1. Explain meaning and importance of genetics.<br>2. Outline various terms used in genetics<br>3. Describe genetic materials and their roles.<br>4. Mention types of variations and their causes. | i) Learners to make self-study on the general concepts of genetics and variation. | • Relevant printed/brailled text books/study materials. | Can the learner explain the general concepts of genetics and variation? | | 8 hrs |
| | | 8.2.2 Mendelian Laws of Inheritance. | The learner should be able to:<br>1. State Mendel's 1st and 2nd Laws of inheritance.<br>2. Describe Monohybrid and Dihybrid crosses of contrasting traits and their ratios.<br>3. Explain inheritance of albinism; tongue rolling, ABO and Rhesus factor (RH) blood grouping and sickle cell anaemia.<br>4. Explain complete and incomplete dominance. | i) Learners to make self study on Mendelian Laws of Inheritance<br>ii) Facilitator to give worked examples on inheritance of various characteristics.<br>iii) Learners to make self-study on inheritance of albinism, tongue rolling, ABO, and Rhesus factor (RH) blood grouping and sickle cell anaemia. | • Printed/tactile pictures/diagrams/ photographs of pea plants<br>• Animals of different colour | Can the learner:<br>a) State and explain Mendelian 1st and 2nd Laws of Inheritance on different traits?<br>b) Explain different Mendelian experiments on monohybrid and dihybrid?<br>c) Explain complete and incomplete dominance? | | |

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| | | 8.2.3. Non-Mendelian inheritance. | The learner should be able to.<br>1. Explain the concept of incomplete dominance and co-dominance.<br>2. Illustrate patterns of inheritance that deviate from the Mendel's First Law of Inheritance. | i) Learners to make self study on incomplete dominance and co-dominance.<br>ii) Facilitator to guide learners to discuss Non-Mendelian Inheritance. | • Printed/tactile charts, pictures/diagrams/ photographs showing members of the same family<br>• Printed/tactile pictures/diagrams photographs showing animals with different colour. | Can the learner<br>a) Explain incomplete and co-dominance?<br>b) Explain patterns that deviate Mendelian 1st Law of Inheritance? | | |
| | | 8.2.4 Sex determination | The learner should be able to:<br>1. Explain the meaning of sex and mechanism of sex determination inheritance and development.<br>2. Explain sex – linked characters. | i) Learners to make self study on sex determination and sex linked characters.<br>ii) Facilitator to guide the learner through illustration and diagrams. | • Printed/tactile pictures and photographs showing different animals<br>• Printed/tactile pictures/diagrams photographs showing animals of different sex. | Can the learner:<br>a) Explain the meaning of sex and mechanism of sex determination inheritance and development?<br>b) Explain sex – linked characters? | | |
| | | 8.2.5 Genetic disorders | The learner should be able to: name the common genetic disorders and their causes. | i) Learners to make self study on genetic disorders. | • Printed/tactile pictures diagrams photographs showing individuals of different genetic disorders. | Can the learner name the common genetic disorders and their causes? | | |
| | | 8.2.6 Genetics in use | The learner should be able to:<br>1. Explain inbreeding and out breeding and give advantages and disadvantages.<br>2. Give the differences between their importance in plants and animal breeding. | i) Learners to make self study on the uses of genetics in life.<br>ii) Learners to outline application of genetics in crop and livestock production. | • Printed/tactile pictures photographs showing genetically modified organisms and foods<br>• Transcribed study materials. | Can the learner explains inbreeding and out breeding, their advantages and disadvantages and their importance in plants and animal breeding? | | |

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| | 8.3. Evolution | 8.3.1. Concept of organic evolution and its evidence. | The learner should be able to:<br>1. Explain the concept of organic evolution.<br>2. Mention sources of evidence which support organic evolution.<br>3. Investigate evidences and application of organic evolution in the real life situation. | i) Facilitator to guide learners through questions and answers to study on the meaning of organic evolution and evidences of organic evolution.<br>ii) Learners to make self study and investigation. | • Printed/braille text extracted from various sources explaining the concept of organic evolution and evidences of organic evolution. | Can the learner:<br>a) Explain the concept of organic evolution and the evidence which supports it?<br>b) Investigate evidence of organic evolution and its application in real life situation? | 3 hrs | 8 hrs |
| | | 8.3.2. Theories of the origin of life. | The learner should be able to:<br>1. Outline the basic ideas about the origin of life.<br>2. State the theories of the origin of life. | i) Learners to make self study on the theories of origin of life. | • Printed/brailled text extracted from various sources explaining theories of origin of life. | Can the learner:<br>Outline the basic ideas of the origin of life and state the theories of life? | | |
| | | 8.3.3. Theories of organic evolution (Lamarckism and Darwinism) | The learner should be able to:<br>1. State Lamarck's and Darwin's theories of Evolution.<br>2. Outline the merits and demerits of Lamarck's and Darwin's theories.<br>3. Explain the theory of natural selection in relation to the mechanism of evolution. | i) Learners to make self study on the theories of organic evolution (Lamarckism and Darwinism).<br>ii) Using guiding questions learners to discuss in small groups the ideas of Lamarck's and Darwin's theories of evolution.<br>iii) The facilitator to lead plenary discussions and guide learners to summarize major ideas, make clarifications and conclusion. | • Printed/tactile chart showing major ideas of the theory of natural selection.<br>• Printed/tactile chart showing summary of Darwin's and Lamarck's theories.<br>• Printed/tactile chart showing the merits and demerits of Lamarck's and Darwin's theories of evolution. | Can the learner<br>a) State Lamarck's and Darwin's theories of evolution?<br>b) Outline the merits and demerits of Lamarck's and Darwin's theories?<br>c) Explain the theory of natural selection in relation to the mechanism of evolution? | | |

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Printing Unit
Institute of Adult Education
Dar es Salaam
Tanzania