



Republic of Rwanda
Ministry of Education



APPLIED BIOLOGY

GENAB402

DEMONSTRATE KNOWLEDGE OF GENERAL BIOLOGY

Competence

RQF Level: 4

Learning Hours



30

Credits: 3

Sector: Agriculture and Food Processing, Hospitality and Tourism

Trade: Agriculture, Food Processing, Animal Health, Forestry, Wood Technology, Water and Irrigation, Leather Technology, Food and beverage operations, Tourism.

Module Type: General

Curriculum: TVET Certificate 4 in Agriculture, Food Processing, Animal Health, Forestry, Wood Technology, Water and Irrigation, Leather Technology, Food and beverage operations, Tourism.

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Issue Date: May 2023

Purpose statement	This module describes the knowledge, skills and attitudes required to demonstrate basic knowledge of Biology. At the end of this module, the learner will be able to describe biological macromolecule's structure and function, illustrate patterns of genetic inheritance and distinguish various microorganisms' structure and their importance					
Delivery modality	Training delivery		100%	Assessment	Total 100%	
	Theoretical content		30%	Formative assessment	30%	
	Practical work:		70%		70%	50%
	• Group project and presentation	20%				
	• Individual project /Work	50%				
		Summative Assessment		50%		

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Describe biological macromolecule's structure and function	1.1. The function of carbohydrates is clearly explained based on their structure
	1.2. The function of lipids is properly discussed based on their structure
	1.3. The function of nucleic acids is correctly illustrated in reference to their structure
	1.4. The function of proteins is effectively explained in reference to their structure
2. Illustrate patterns of genetic inheritance	2.1. Genetics is clearly explained basing on its importance
	2.2. Genetic inheritance is properly discussed based on Mendel's Laws and non-Mendel inheritance
	2.3. Genetic mutations are correctly explained based on phenotype modifications
3. Distinguish various microbial	3.1. Microbiology is clearly explained referring to its historical development
	3.2. Microbes are correctly characterised based on their diversity

**structures and
their importance**

3.3. Microbial nutrition is effectively discussed based on their growth requirements

Course content

Learning outcomes	At the end of the module the learner will be able to: <ol style="list-style-type: none"> 1. Describe biological macromolecule's structure and function 2. Illustrate patterns of genetic inheritance 3. Distinguish various microbial structures and their importance
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Learning outcome 1: Describe biological macromolecules structure and function	Learning hours: 10
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Indicative content

<ul style="list-style-type: none"> • Explanation of the function of carbohydrates <ul style="list-style-type: none"> ✓ Structural classification of carbohydrates ✓ Carbohydrates metabolism ✓ Functions of carbohydrates • Explanation of lipids' function <ul style="list-style-type: none"> ✓ Structural classification of lipids ✓ Functions of lipids • Explanation of Nucleic acids' function <ul style="list-style-type: none"> ✓ Structure of nucleotides ✓ Types of nucleic acids <ul style="list-style-type: none"> ✚ DNA ✚ RNA ✓ DNA replication and its importance ✓ DNA transcription • Explanation of proteins' function <ul style="list-style-type: none"> ✓ Protein structure and function ✓ Protein synthesis
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Resources required for the learning outcome

Equipment	Computer, Projector, White board/ Chalkboard
Materials	Flipcharts, Papers, Wallcharts
Tools	Markers, Chalks, Tutorial videos, Pictures

Facilitation techniques	Brainstorming, Demonstration and simulation, Individual and group work, Group discussion
Formative assessment methods	Written assessment, Oral presentation

Learning outcome 2: Illustrate patterns of genetic inheritance	Learning hours: 10
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Indicative content

- **Genetic significance explanation**
 - ✓ Introduction to genetics
 - ✚ Etymology
 - ✚ Genotype and phenotype
 - ✚ History of Genetics
 - ✓ Importance of genetics
- **Genetic inheritance explanation**
 - ✓ Concept of genetic inheritance
 - ✓ Mendel's Laws and experiments
 - ✓ Chromosomal Theory
- **Introduction to Genetic mutations**
 - ✓ Concept of genetic mutations
 - ✓ Causes of genetic mutations
 - ✓ Types of genetic mutations
 - ✓ Effects of genetic mutations

Resources required for the indicative content

Equipment	Computer, Projector, White board/ Chalkboard
Materials	Flipcharts, Papers, Wall charts
Tools	Markers, Chalks, Tutorial videos, Pictures
Facilitation techniques	Brainstorming, Demonstration and simulation, Individual and group work, Group discussion
Formative assessment methods	Written assessment, Oral presentation

Learning outcome 3: Distinguish various microbial structures and their importance

Learning hours: 10

Indicative content

- **Introduction to Microbiology**
 - ✓ History of microbiology
 - ✓ Importance of microbes
 - ✚ Benefits of microbes
 - ✚ Harmfulness of microbes
- **Characterisation of microbes**
 - ✓ Bacteria
 - ✓ Virus
 - ✓ Fungi
 - ✓ Algae
 - ✓ Protozoa
- **Explanation of Microbial growth**
 - ✓ Microbial growth requirements
 - ✓ Bacterial growth phases
 - ✓ Culturing and observation of microbes in the laboratory

Resources required for the indicative content

Equipment	Incubator, microscopy, computer, projector, white board/ chalkboard
Materials	Flipcharts, papers, wallcharts, reagents (agar, nutrients, etc.)
Tools	Slides, cover slides, plates, markers, chalks, tutorial videos, pictures
Facilitation techniques	Brainstorming, demonstration and simulation, individual and group work, group discussion
Formative assessment methods	Written assessment, oral presentation

References:

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3. Frank Lowy. (2008). Bacterial Classification, Structure and Function.
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5. D. S. Weiss. (2004). Molecular Microbiology-Bacterial cell division and the septal ring. vol. 54, pp. 588-597.
6. Chenn Peter, Murray John, 1999. Microorganisms and Biotechnology
7. Michael Robert, Michael Jonathan Reiss, Grace Monger; Advanced Biology, Nelson Publishers, UK
8. <https://sites.ualberta.ca/~enoch/Resources/Genetics.pdf>
9. <https://nios.ac.in/media/documents/SrSec314NewE/Lesson-22.pdf>