ASSESSMENT GUIDELINES FOR BIOLOGY AT ADVANCED SECONDARY LEVEL

1.1 INTRODUCTION

Biology in the Advanced Secondary Curriculum (ASC) is assessed at school and at the End of the Cycle examinations, which are administered by the Uganda National Examinations Board (UNEB).

Assessment of Biology at the school level will be formative and summative. Formative assessment will be done through observation (watching learners working), conversation (asking questions and talking to learners), and appraising the learner's work (product).

While summative assessment will be done through engaging learners in activities of integration at the end of each topic and an examination at the end of the year. School-based formative and summative assessments will be designed to build and improve student understanding in preparation for the End of Cycle Assessment.

The End of Cycle Assessment for Biology for the Advanced Secondary Curriculum will be guided by assessment objectives based on the constructs. A construct is an abstract representation of a unifying theme that brings coherence to an assessment task. It serves as a generalized concept that combines a cluster of related learning outcomes or competencies—each contributing to a common learning ability. Acquisition of learning outcomes/ competencies in a construct enables the learner to demonstrate mastery in a way that supports real-life functionality and application.

1.2 ASSESSMENT OBJECTIVES

The end of Cycle assessment for Biology will be guided by four assessment objectives focusing on the learner's ability to:

AO1: Evaluate the significance of the interactions that sustain life and energy production by analysing the structure of cells and tissues, the roles of biomolecules (water, lipids, proteins, and nucleic acids), and the processes of ATP production, cell division, and protein synthesis, in order to apply these biological principles to challenges in genetic technologies and health improvement.

AO2: Evaluate plant structure and physiology by analysing structural adaptations and photosynthetic pathways in C_3 and C_4, environmental influences on photosynthesis, plant adaptations (to water availability), growth, photoperiodism, and the hormonal control of growth, to promote sustainable agricultural practices that improve crop yield and food security.

AO3: Evaluate the structure and physiology of animal sensory organs and systems (circulatory, nervous, immune,

and homeostatic) by analysing blood circulation, gas transport, immunity (vaccination and allergies), neural transmission, sensory perception, homeostatic control, and the role of adaptive behaviours in survival, to make informed health decisions and promote animal welfare

AO4: Evaluate the principles of genetics, evolutionary mechanisms, and ecological interactions by analysing Mendelian and non-Mendelian genetics, species evolution, speciation, resistance, extinction, population dynamics, ecosystem balance, and carbon emissions, to create sustainable strategies for managing invasive species, enhancing food security, and mitigating climate change.

The table below shows a linkage between the assessment objectives, the constructs, and the topics that contribute to the construct.

Table 1: Table showing the relationship between assessment objectives, constructs, and the topics in the syllabus

Assessment Objective	**Construct**	**Construct Description**	**Topics in the syllabus**
AO1 Evaluate the significance of the interactions that sustain life and energy production by analysing the structure of cells, tissues and levels of organisation, the roles of biomolecules (water, lipids, proteins, and nucleic acids), and the processes of ATP production, cell division, and protein synthesis, in order to apply these biological principles to challenges in genetic technologies and health improvement.	Cellular Organisation, Respiration, and Molecular Analysis	Investigating the structure of cells, tissues and levels of organisation, the roles of biomolecules (water, lipids, proteins, and nucleic acids), and processes of ATP production, cell division, protein synthesis, and genetic manipulation, by analysing how they interact to sustain life, then ethically apply biological principles in genetic technologies and health improvement	1. Cell Biology 4. Respiration 7. Inheritance and Evolution

AO2 Evaluate plant structure and physiology by analysing structural adaptations and photosynthetic pathways in C_3 and C_4, environmental influences on photosynthesis, plant adaptations (to water availability), growth, photoperiodism, and the hormonal control of growth, to promote sustainable agricultural practices that improve crop yield and food security.	Plant physiology and adaptation	Evaluating plant structure and physiology by analysing structural adaptations and photosynthetic pathway differences in C_3 and C_4, plant adaptations (to water availability), environmental influence on photosynthesis, growth, photoperiodism, and the hormonal control of growth, to promote sustainable agricultural practices that improve crop yield and food security.	2. Nutrition in plants 6. Co-ordination 8. Growth in Plants and Development in Insects
AO3 Evaluate the structure and physiology of animal sensory organs and systems (circulatory, nervous, immune, and homeostatic) by analysing blood circulation, gas transport, immunity (vaccination and allergies), neural transmission, sensory perception, homeostatic control, and the role of adaptive behaviours in survival, to make informed health decisions and promote animal welfare	Analysis of animal systems and behaviours in adapting to environmental changes for health, survival, and welfare	Evaluating the structure and physiology of animal sensory organs and systems (circulatory, nervous, immune, and homeostatic) by analysing blood circulation, gas transport, immunity (vaccination and allergies), neural transmission, sensory perception, homeostatic control, and how adaptive behaviours support survival to make informed health decisions and promote animal welfare	3. Transport in Humans 5. Homeostasis 6. Co-ordination
AO4	Genetic, evolution		7. Inheritance and Evolutio

Evaluate the principles of genetics, evolutionary mechanisms, and ecological interactions by analysing Mendelian and non-Mendelian genetics, species evolution, speciation, resistance, extinction, population dynamics, ecosystem balance, and carbon emissions, to create sustainable strategies for managing invasive species, enhancing food security, and mitigating climate change.	ary, and ecological dynamics	Evaluating inheritance patterns, evolutionary mechanisms, and ecological interactions by analysing Mendelian and non-Mendelian genetics, species evolution, speciation, resistance, extinction, population dynamics, ecosystem balance, and carbon emissions, to inform sustainable strategies for managing invasive species, promoting food security, and mitigating climate change.	n 8. Growth in Plants and Development in Insects 9. Ecology

TABLE OF CONSTRUCTS

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
Cellular Organisation, Respiration, and Molecular Analysis Investigating th	1(b): Operate a light microscope to observe plant and animal tissues under magnification. (s, gs)	I. Use a light microscope	I. Focuses a light microscope II. Prepares and mounts temporary slides III. Estimates cell size IV. Calculates linear magnification	Medium

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
e structure of cells and tissues, the roles of biomolecules (water, lipids, proteins, and nucleic acids), and processes of ATP production, cell division, and protein synthesis, by analysing how these components interact	1(c) Analyse the ultrastructure of animal/plant cells, bacterial cells, and plasma membrane to distinguish prokaryotic/eukaryotic characteristics.	I. Analyse the ultrastructure of animal, plant bacterial cells II. Use a light microscope to analyse the structures of cells. III. Distinguish between eukaryotic cells and prokaryotic cells.	I. Identifies parts of the animal, plant cells, and bacterial cells observed in an electron microscope. II. Identifies functions of parts of the plant, animal, and bacterial cells observed in the electron microscope III. Relates the structure of parts of the cells observed in the electron microscope to their functions IV. Explains the differences between eukaryotic cells and prokaryotic cells.	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
to sustain life and energy production, to apply biological principles in genetic technologies and health improvement	1. (d) Analyse the structures of plant (parenchyma, collenchyma, sclerenchyma, xylem, and phloem) and animal (epithelial, cardiac, areolar, fibrous, and skeletal) tissues to assess their roles in physiological processes, disease diagnosis, and levels of organisation. (u, s, v/a, gs).	I. Analyse the features of healthy tissues and diseased tissues II. Relate the structure and location of tissues to their roles. III. Use a microscope to study tissues.	I. Describes the structure of tissues II. Identifies types and locations of tissues in plants and animals. III. Analyses how the structure and location tissues relate to their functions. IV. Compares healthy tissues with diseased tissues V. Extracts plant and animal tissues for scientific investigations	High
	1(a): Analyse the properties and functions of chemical compounds (water, lipids, and proteins including enzymes from mammals) in a cell, focusing on their roles in maintaining cellular structure and metabolic processes in living organisms. (s, gs) (Thermal properties of water not required.)	I. Relate properties of water, lipids, and proteins to cellular structure II. Relate properties of water lipids, and proteins to metabolic processes III. Plan and carry out investigations on the properties of water, lipids, proteins, and enzyme	I. Identifies properties of water, lipids, and proteins. II. Identifies roles of water, lipids, and proteins in cellular structure and metabolic processes. III. Explains how the properties of water, lipids, and proteins relate to their roles in cellular structure and metabolic processes. IV. Generates clear aims, hypotheses, and procedures for scientific investigations on properties of chemical compounds.	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		s IV. Compare the suitability of properties of water, lipids, proteins, and enzymes in performing metabolic processes and in cellular structures	V. Identifies and uses appropriate apparatus during scientific investigations VI. Obtains experimental data and presents it in an orderly form VII. Analyses data and provides appropriate recommendations. VIII. Extracts enzymes from the animal digestive system	
	4(a): Examine the relationship between the structure of the mitochondrion and the stages of cellular respiration in living organisms. (u, s)	I. Describe mitochondrial structure. II. Relate the structure of the mitochondrion to its functions and stages of cellular respiration.	I. Relates the stages of cellular respiration to the structure of the mitochondrion. II. Describes ATP production stages. III. Describes the energy release from ATP.	
	4(b): Analyse the biochemical processes leading to ATP production in living organisms, and how these processes are affected by physical activities and respiratory poisons (cyanide). (u, s, gs, v/a).	I. Analyse ATP production in living organisms. II. Assess the alternative respiratory substrates in living organisms and th	I. Identifies the common respiratory poisons. II. Explains how physical activities and respiratory poisons affect ATP production. III. Explains weight loss during starvation.	

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	(Details of biochemistry are not required)	e implications of using them. III. Relate physical activities and respiratory poisons to ATP production		
	7(a): Analyse the structural and functional significance of nucleic acids in meiosis and mitosis, their role in cellular functions, and how mutations in nucleotide sequences can contribute to disease (cancer). (u, s, gs, v/a)	I. Analyse the properties of DNA and RNA. II. Analyse the relationship between DNA and protein structure. III. Describe the processes of protein synthesis, DNA replication, and Cell division. IV. Explain how mutation contributes to disease. V. Explain risk factors, prevention methods, and management of cancer. VI. Plan and carry out a scientific inves	I. Describes the structure and components of DNA and RNA. II. Compares the events of mitosis and meiosis. III. Explains the role of nucleic acids in mitosis and meiosis. IV. Relates to DNA replication to protein synthesis V. Explains how mutations alter protein function and cause uncontrolled cell division. VI. Explains how risk factors contribute to cancer development through DNA mutation and uncontrolled cell division. VII. Describes methods for cancer prevention. VIII. Explains common cancer management strategies. IX. Generates clear aims, hypotheses, and procedures for scienti	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		tigation on the behaviour of chromosomes during cell division.	fic investigations of chromosome behaviours X. Identifies and uses appropriate apparatus during scientific investigations XI. Analyses data and provides appropriate recommendations. XII. Identifies regions of mitosis in onion roots. XIII. Identifies the different stages of mitosis. XIV. Describes the features of the cell at the different stages of mitosis. IV. Uses a light microscope to observe stages of mitosis in a growing plant.	
	7(b): Assess gene technology techniques, their applications in various fields, and the associated ethical implications. (u, s, gs, v/a)	I. Contrast genetic engineering techniques. II. Explore the ethical implications of genetic engineering. IV. Assess applications of gene technologies and their e	I. Describes major gene technology techniques and their real-world application. II. Contrasts gene technology techniques. III. Assesses the different ethical considerations in genetic engineering. V. Recognises the potential risks and environmental impacts of	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		nvironmental implications.	using gene technology.	
Plant physiology and adaptation Evaluating plant structure and physiology by analysing structural adaptations and photosynthetic pathway differences in C_3 and C_4, plant adaptations (to water availability), environmental influence on photosynthesis, growth, photoperiodism, and the hormonal control of growth,	2(a): Evaluate the relationship between the structure of chloroplast and photosynthesis in C3 and C4 plants. (u, s, gs)	I. Relate the structure of a chloroplast in C3 and C4 plants to function. II. Compare the photosynthetic pathways of C3 and C4 plants. III. Describe glucose, protein, and lipid synthesis pathways. IV. Plan and carry out a scientific investigation on photosynthetic efficiency in C3 and C4 plants	I. Explains the advantages and disadvantages of organisms at the cellular, tissue, and organ levels. II. Identifies the structural components of a chloroplast III. Explains the function of chloroplast structures in photosynthesis. IV. Analyses how structural differences in chloroplasts affect photosynthetic efficiency. V. Distinguishes the photosynthetic pathways in C3 and C4 plants. VI. Explains the process of glucose, protein, and lipid synthesis. VII. Assesses the advantages and limitations of photosynthesis in C3 and C4 plants. VIII. Generates clear aims, hypotheses, and procedures for scientific investigations on photosynthetic efficiency in C3 an	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
to promote sustainable agricultural practices that improve crop yield and food security.,			d C4 plants IX. Identifies and uses appropriate apparatus during scientific investigations X. Obtains experimental data and presented it in an orderly form XI. Analyses data and provides appropriate recommendations	
	2(b): Assess the influence of environmental factors on the photosynthetic efficiency of plants to optimise photosynthetic rates and crop yields. (u, s, gs, v/a)	I. Analyse the distribution and abundance of C3 and C4 plants at different altitudes, temperatures, and oxygen levels. II. Relate the influence of environmental factors on photosynthetic efficiency to crop yields. III. Use a light microscope to study the structure of guard cells IV. Plan and carry ou	I. Assesses the advantages and limitations of photosynthesis in C3 and C4 plants. II. Identifies the environmental factors that affect the rate of photosynthesis, hence crop yields. III. Analyses the effect of environmental factors on the rate of photosynthesis IV. Explains the concept of limiting factors and compensation points V. Observes the structure of guard cells using a microscope VI. Generates clear aims, hypotheses, and procedures for scienti	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		t a scientific investigation on the effect of environmental factors on photosynthetic efficiency	fic investigations on the behaviour of guard cells and the effect of environmental factors on photosynthetic efficiency VII. Identifies and uses appropriate apparatus during scientific investigations VIII. Obtains experimental data and presents it in an orderly form IX. Analyses data and provides appropriate recommendations.	
	5(b): Examine the adaptations and management of different plant categories (xerophytes, mesophytes, hydrophytes) based on their osmoregulatory abilities and the application of excretory plant products in everyday life. (u, s, gs, v/a)	I. Analyse the distribution and abundance of different plant categories in relation to water availability in various environments II. Evaluate management strategies of the different plant types with different water needs	I. Examines the adaptations of plants to different levels of water availability in the environment. II. Describes and carries out management strategies of plants with different water needs. III. Identifies plant excretory products and their uses in everyday life. IV. Generates clear aims, hypotheses, and procedures for scientific investigations of stomatal distribution	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		(xerophytes, mesophytes, and hydrophytes) III. Analyse the application of plant excretory products in everyday life. IV. Plan and carry out investigation on stomatal distribution in xerophytes mesophytes, and hydrophyte	V. Identifies and uses appropriate apparatus during scientific investigations	
	6(a): Examine the role of plant hormones in tropisms, photoperiodism, and the application of these processes in agricultural practices. (u, s, gs, v/a)	I. Analyse the effects of plant hormones on tropisms, photoperiodism, and crop yields II. Assess the use of plant hormones in agricultural practices to optimize crop yield. III. Plan and carry out experiments on t	I. Applies hormones to improve crop yields (SBA) II. Generates clear aims, hypotheses, and procedures for scientific investigations on the effects of hormones, the different excretory products in plants and stomatal behaviour in varying amounts of water. III. Identifies and uses appropriate apparatus during scientific investigations	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		he effects of plant hormones on growth and development. IV. Plan and carry out scientific investigation on the role of plant hormones in tropisms, photoperiodism and applications of plant hormones	IV. Obtains experimental data and presents it in an orderly form V. Analyses data and provides appropriate recommendations.	
	8(a): Analyse the pre- and post-germination stages during the growth and development of plants in relation to their significance in crop production. (u, s, gs, v/a)	I. Analyse the concept of seed dormancy and seed banks. II. Analyse physical changes in meristems at different stages of growth and development. III. Compare the significance of primary and secondary growth. IV. Analyse strategie	I. Explains the meaning of and factors that lead to seed dormancy. II. Justifies the need for seed banks. III. Investigates cell size and appearance in the different regions of a young dicotyledonous root and shoot by microscopic examination. IV. Describes the processes of primary and secondary growth in plants. V. Explains the importance of pri	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		s of enhancing germination, growth, and development in plants. V. Examine factors that affect measurement of growth. VI. Plan and carry out scientific investigations on rates and patterns of growth	mary and secondary growth in plants. VI. Develops strategies of how farmers can enhance germination, growth, and development in plants. VII. Generates clear aims, hypotheses, and procedures for scientific investigations on measurements of growth VIII. Identifies and uses appropriate apparatus during scientific investigations. IX. Analyses data and provides appropriate recommendations. X. Explains how organisms at cellular, tissue, and organ levels perform life processes. XI. Explains the advantages and disadvantages of organisms at the cellular, tissue, and organ levels.	

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
Analyses animal systems and behaviours in adapting to environmental changes for health, survival, and welfare. Evaluating the structure and physiology of animal sensory organs and systems (circulatory, nervous, immune, and homeostatic) by analysing blood circulation, gas transport, immunity (vaccination and allergies), neural transmission, sensory perception, hom	3 (a) Assess the role of the human heart in blood circulation and the role of haemoglobin in the transportation of gases in blood under various physiological conditions. (u, s, gs, v/a)	I. Describe how oxygen and carbon dioxide are transported in the body II. Analyse the physiological factors that affect the amount and transportation of oxygen and carbon dioxide in the body. III. Explain the role of the brain, sinoatrial node, and atrioventricular node during the regulation of the heartbeat.	I. Describes the structure and reaction of haemoglobin with oxygen and carbon dioxide II. Explains the behaviour of oxygen dissociation curves under various physiological conditions III. Explains the importance of the Bohr effect. IV. Explains the causes, effects, and management of carbon monoxide poisoning. V. Describes different mechanisms of carbon dioxide transportation in the body. VI. Explains the circulatory differences between athletes and non-athletes and low and high land dwellers VII. Relates the structure of the heart to myogenic action and heartbeat rate. VIII. Explains the role of the brain in heartbeat. IX. Relates physiological conditions of the body to the heartbeat rate.	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
eostatic control, and how adaptive behaviours support survival to make informed health decisions and promote animal welfare	3 (b) Analyse the role of antibodies in vaccination and allergic reactions in relation to human body immunity. (u, s, gs, v/a)	I. Explain the different types of immunity. II. Analyse the action of antibodies in vaccination and the allergic reactions. III. Explain the effects of the Rhesus factor on compatibility (eg, pregnancy, blood transfusion)	I. Describes the structure of an antibody. II. Describes how antibodies are produced in response to vaccines. III. Relates the role of antibodies in immunity and vaccination in disease prevention in communities. IV. Explains how antibodies are involved in allergic reactions. V. Differentiates between immune responses in vaccination and allergic reactions. VI. Describes how Rh incompatibility can cause new born haemolytic disease. VII. Explains how the Rhesus blood groups affect blood transfusion. VIII. Explains the functioning of rapid test kits.	High
	5(a): Analyse the homeostatic control system, focusing on the role of negative feedback mechanisms in maintaini	I. Analyse the working of an efficient homeostatic system.	I. Identifies the key components of a homeostatic control system. II. Explains how negative feedba	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	ng internal stability. (u, s, gs)	II. Explain the significance of maintaining a stable internal environment. III. Analyse the role of the hypothalamus and the skin in temperature regulation in endotherms. IV. Examine the characteristics and behaviour of endotherms surviving in different temperature conditions. V. Explain the control of ADH production and the role of ADH in water balance in endotherms.	ck works to maintain internal stability. III. Examines the responses and adaptations of endotherms to temperature changes. (SBA) IV. Describes the roles of the hypothalamus, thermo receptors, and effectors in temperature regulation. V. Explains the role of the hypothalamus and the pituitary gland in the secretion of ADH and the conditions that affect its production. VI. Explains how ADH controls water reabsorption in the kidney nephrons to ensure water balance in the body.	
	6(b): Analyse impulse transmission in relation to the structure of a neurone, a chemic	I. Analyse events during resting potential, action potential, hyperpolariza	I. Identifies the types and properties of neurone. II. Relates the structure of neurone to its functioning.	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	al synapse, and the factors that influence neural activity in response to environmental stimuli. (u, gs, v/a)	tion, and synaptic transmission. II. Relate neuron structure, magnitude, and frequency of stimulation to impulse transmission. III. Analyse the effects of warm-ups and ice-cold first aid on impulse transmission. IV. Assess how environmental stimuli affect impulse transmission. V. Explain the functioning of local anaesthetics	III. Analyses how potential differences are achieved during polarised, depolarised, and hyperpolarised states of the neurone. IV. Explains impulse transmission across the synapse. V. Explains how different factors affect the speed of impulse transmission. VI. Explains the significance of warm-ups and ice cold first aid in impulse transmission. VII. Identifies the examples of local anaesthetics. VIII. Explains how local anaesthetics work	
	6(c): Examine the properties and functions of sensory receptors, the role of the retina in visual perception, and the ear's organs of balance in relation to their response to envir	I. Analyse the properties and functions of different types of sensory receptors. II. Explain the role of	I. Identifies types of receptors and stimuli II. Explains the properties of sensory receptors III. Describes stimulus perception by sensory receptors	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	onmental stimuli. (u, s, gs, v/a)	the retina in visual perception III. Analyse how the ear maintains balance during motion and in still position.	IV. Relates the structure of the retina to visual perception V. Relates the structure and distribution of photoreceptors on the retina to visual perception VI. Describes the structure of the organ of balance in the ear VII. Analyses how balance is maintained during stationary and movement positions by the ear	
	6(d): Examine adaptive animal significance of diverse animal behaviour in promoting survival and reproductive success. (u, s, gs, v/a)	I. Identify types of animal behaviour. II. Relate animal behaviours to survival and reproductive success.	I. Classifies different animal behaviours. II. Analyses the role of innate behaviours in survival and reproduction. III. Explains how each learned behaviour contributes to the survival and reproduction of organisms. IV. Manages animals based on their behavioural patterns.	
Genetic evolutionary and ecological dynamic	7(c): Apply Mendelian principles to predict inheritance patterns and utilise mathemati	I. Apply Mendelian laws of inheritance.	I. Explains Mendel's laws of inheritance. II. Identifies genotype and pheno	

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
s Evaluating inheritance patterns, evolutionary mechanisms, and ecological interactions by analyzing Mendelian and non-Mendelian genetics, species evolution, speciation, resistance, extinction, population dynamics, ecosystem balance, and carbon emissions, to inform sustainable strategies for managing invasive species, promoting food security, and mitigating climate change.	cal models to analyse allele frequencies and genotype distributions within populations. (u, s)	II. Analyse allele frequencies and genotype distributions within populations. III. Analyse the factors that affect genetic equilibrium. IV. Plan and carry out a scientific investigation on Mendelian inheritance (SBA).	type ratios from monohybrid and dihybrid crosses. III. Uses Punnett squares and probability to predict outcomes of crosses. IV. Calculates allele and genotype frequencies in populations using the Hardy-Weinberg equation. V. Describes how allele frequencies relate to genotype distributions. VI. Explains factors that affect genetic equilibrium. VII. Generates clear aims, hypotheses, and procedures for scientific investigations on Mendelian inheritance. VIII. Identifies and uses appropriate apparatus during scientific investigations. IX. Analyses data and provides appropriate recommendations.	
	7(d): Examine different forms of allele interactions (autosomal linkage, multiple allele	I. Examine different forms of allele interactions.	I. Distinguishes types of allele interactions, including codominance, incomplete dominance,	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	s, codominance, and incomplete dominance), including their examples and influence on phenotypic expression. (u, s, gs)	II. Distinguish Mendelian from non-Mendelian inheritance. III. Analyse observed vs. expected genetic ratios. IV. Plan and carry out a scientific investigation on non-Mendelian inheritance (SBA)	multiple alleles, and autosomal linkage. II. Identifies examples of each type of allele interaction III. Uses Punnett squares and pedigree analysis to show how each allele interaction influences phenotypic expression IV. Differentiates between Mendelian and non-Mendelian inheritance patterns. V. Generates clear aims, hypotheses, and procedures for scientific investigations on non-Mendelian inheritance VI. Identifies and uses appropriate apparatus during scientific investigations VII. Analyses data and provides appropriate recommendations.	
	7(e): Analyse evolutionary advancements in key life processes (circulation, reproduction, gaseous exchange, coordination, movement, and excretion), as well as their suitabili	I. Compare the advancement in life processes in different organisms. II. Plan and carry out investigations o	I. Explains how adaptations enhance survival in specific environments. II. Describes evolutionary adaptations in systems across species.	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	ty for survival across different species. (u, s, gs, v/a)	n evolutionary advancements. III. Compare the structures of organisms to identify evolutionary advancement.	III. Carries out dissections to investigate structural and physiological advancements in organisms. IV. Generates clear aims, hypotheses, and procedures for scientific investigations on structural and physiological advancements in organisms. V. Identifies and uses appropriate apparatus during scientific investigations. VI. Analyses data and provides appropriate recommendations.	
	7(f): Assess speciation and resistance, mechanisms driving them, and factors contributing to extinction events, through comparison of historical and contemporary examples. (u, s, gs, v/a)	I. Examine the process of speciation II. Analyse resistance and extinction in organisms. III. Analyse impacts of antimicrobial and pesticide resistance and suggest way forward. IV. Assess the occurrence of endanger	I. Describes allopatric and sympatric speciation. II. Compares different mechanisms of isolation. III. Explains the modern theory of evolution as mechanisms of development of antimicrobial and pesticide resistance. IV. Proposes practical solutions to the impacts of antimicrobial and pesticide resistance. V. Analyses the causes and exte	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		ed species and extinction	nt of extinction in Earth's history. VI. Assesses current threats to biodiversity. VII. Suggests strategies to prevent the extinction of endangered species.	
	8(b): Analyse the role of insect growth stages in ecosystems, focusing on their contributions to waste management, food security, and water quality assessment. (u, s)	I. Assess the contribution of insects to waste management, food security, and water quality assessment. II. Compare water quality in different locations using insect bio indicators III. Relate the trends and patterns in insect populations to crop productivity. IV. Plan and carry out investigations on water quality assessment.	I. Explains the role of the different insect stages in waste management, food security, and water quality assessment. II. Relates insect population density to water quality in different locations. III. Explains how trends and patterns in insect populations affect crop productivity. IV. Generates clear aims, hypotheses, and procedures for scientific investigations on water quality assessment. V. Identifies and uses appropriate apparatus during scientific investigations VI. Analyses data and provides appropriate recommendations.	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
	9(a): Analyse population dynamics and the factors affecting them in different ecosystems. (u, s, gs, v/a)	I. Relate a population's growth pattern to its features II. Evaluate the factors affecting population dynamics. III. Estimate population size using quadrats and capture-recapture techniques	I. Identifies the characteristics of a population II. Explains the different population growth patterns in ecosystems III. Analyses how different factors affect patterns of population distribution and size. IV. Identifies and uses appropriate materials to estimate population size V. Designs coherent procedures to estimate population size VI. Manipulates data to estimate the population size	High
	9(b): Analyse the processes of ecological succession and strategies for effective ecological restoration practices in diverse environments. ()	I. Explain ecological succession and ecological restoration practices. II. Compare ecological succession and ecological restoration III. Plan and carry out ecological restoration in the com	I. Identifies the stages of primary and secondary succession II. Examines the similarities and differences between primary and secondary succession III. Explains the role of succession in ecosystems IV. Identifies the characteristics of degraded ecosystems V. Uses different techniques of ecological restoration. (SBA)	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		munity (SBA)	VI. Examines the impact of ecological restoration in various communities VII. Identifies differences between ecological succession and ecological restoration	
	9(c): Examine the concept of energy flow through ecosystems, its role in maintaining ecosystem stability, and the impact of human activities on energy flow. (u, s)	I. Recognise patterns of energy flow in natural and disturbed ecosystems. II. Relate changes in energy flow to ecosystem stability. III. Assess the impacts of bioaccumulation and biomagnification during energy flow. IV. Plan and carry out a scientific investigation on nutrient assimilation at each trophic level V. Explain the impact of human activit	I. Identifies the sequence of energy flow in an ecosystem II. Explains the importance of energy flow in an ecosystem III. Explains the assimilation of energy during energy flow. IV. Explains energy loss during energy flow. V. Compares the impacts of bioaccumulation and biomagnification during energy flow. VI. Analyses the role of humans and their activities in energy flow VII. Generates clear aims, hypotheses, and procedures for scientific investigations on nutrient assimilation at each trophic level VIII. Identifies and uses approp	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
		ies on energy flow	riate apparatus during scientific investigations IX. Analyses data and provides appropriate recommendations.	
	9(d): Explain the concept of carbon footprint in relation to climate change, including its measurement, as well as the role of carbon sequestration in mitigating climate change. (u, gs, v/a)	I. Analyse personal and societal activities to identify those with high carbon footprints. II. Relate human activities, carbon emissions, and climate change to carbon sequestration mitigation strategies. III. Plan and carry out scientific measurement of the carbon footprint	I. Identifies human activities that lead to increased carbon output II. Compares the rate of carbon emissions to the extent of climate change. III. Explains the role of vegetation in improving the climate. IV. Implements activities that reduce carbon output V. Generates clear aims, hypotheses, and procedures for scientific investigations on the measurement of carbon footprint VI. Applies standard emission factors to accurately calculate and report the carbon footprint for a specific, defined entity. VII. Identifies and uses appropriate apparatus during scientific investigations	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
			VIII. Analyses data and provides appropriate recommendations.	
	9(e): Examine the impact of invasive species on native biodiversity, ecosystems, and economies, as well as strategies for their management and control. (u, s, gs, v/a)	I. Investigate common local invasive plant or animal species II. Describe how invasive species disrupt ecosystem processes. III. Compare the efficiency and consequences of various control methods on the ecosystem. IV. Analyse trends in invasive species spread and impact V. Design and carry out management of invasive species (SBA)	I. Examines organisms and identifies characteristics of invasive species II. Compares the morphological characteristics between native and invasive species. III. Assesses the impact of invasive species on ecosystems, biodiversity, and economies. IV. Identifies methods of managing invasive species. V. Explains the considerations made while selecting a control method. VI. Compares the impacts of different methods of controlling invasive species. (SBA) VII. Identifies appropriate materials to use to manage invasive species. VI. Develops procedures and safety precautions in managing invasive species	High

CONSTRUCT	LEARNING OUTCOMES The learner should be able to:	ABILITIES	INDICATORS OF MASTERY	LEVEL OF COMPLEXITY
			VII. Presents data from the management of species and makes recommendations	
	9(f): Analyse the concept of food security, focusing on its components and sustainable agricultural practices to address its challenges. (u, s, gs, v/a)	I. Analyse the concept of food security. II. Assess the effectiveness of food security interventions or practices. III. Assess government policies/ initiatives in Uganda aimed at promoting food security.	I. Explains the meaning of food security using specific local examples. II. Explains the components of food security and their roles in maintaining a stable food supply. III. Describes the different threats to food security. IV. Explains different agricultural practices aimed at addressing food insecurity. V. Critiques the different government policies/ initiative aimed at promoting food security.	High

3.0 STRUCTURE OF THE EXAMINATION PAPERS

There will be two examination papers for Biology at the Advanced Secondary level.

Paper 1 (Theory) will contain two sections, A and B. The items in the paper will be scenario-based. The paper will take 3 hours.

Section A

- This will have two compulsory items.
  One item will come from construct 1 (**Cellular organisation, respiration, and molecular Analysis**), addressing assessment objective 1, and the other from construct 2 (**Plant physiology and adaptation**), addressing assessment objective 2.

Section B

- This will consist of parts I and II. The section will have four test items.
- Part I will have two items that come from construct 3 (**Organismal systems and homeostasis**), addressing assessment objective 3.
- Part II will two items from construct 4 (**Genetic, evolutionary, and ecological dynamics**), addressing assessment objective 4.
- A learner will respond to one item from each construct (Part).

Paper 2 (Practical) will contain two compulsory items, and the paper will take 3 hours. The items in the paper will be scenario-based.

- Items in this paper will come from any of the four constructs addressing their respective assessment objectives.
- One item will require the use of scientific investigations to solve a challenge presented in the scenario.
- The second item will require relating structural and behavioural mechanisms to the survival advantage of the organism.

4.0 BASIS OF ASSESSMENT

The table below shows the basis assessment of each construct for paper 1.

Table 2: Table showing bases of assessment of each construct for paper 1

CONSTRUCT	BASIS OF ASSESSMENT	LEVELS OF ACHIEVEMENT				
		5	4	3	2	1
		Exceptional	Outstanding	Satisfactory	Basic	Elementary