



**Kingdom of Lesotho
Ministry of Education and
Training.**

GRADE 9 BIOLOGY SYLLABUS 2019



MOHLOLI OA THUTO

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	i
INTRODUCTION.....	ii
TEACHING BIOLOGY.....	iv
AIMS.....	v
OBJECTIVES.....	v
COMPETENCIES.....	v
TEACHING HOURS.....	v
GRADE 9 BIOLOGY SYLLABUS OVERVIEW.....	1
GRADE 9 BIOLOGY SYALLBUS ACTIVITY PLAN.....	2

ACKNOWLEDGEMENTS

The National Curriculum Development Centre (NCDC) and the Examination Council of Lesotho (ECOL) would like to express their heartfelt appreciation to the following members of the national Biology panel members for their hard work, commitment, and invaluable contribution towards the design and development of this syllabus. The members of the National Biology Panel are:

- | | |
|----------------------------|-----------------------|
| 1. Mpho Sekhosana-Nyenyene | NCDC |
| 2. Malerato Thotolo | Inspectorate |
| 3. Makabelo Letuma | Methodist High School |
| 4. Nosiyabonga Mlonyeni | Abia High School |
| 5. `Masalemone Tšeane | Hermitage High School |
| 6. Lira Molapo | Inspectorate |

INTRODUCTION

The National Curriculum Development Centre (NCDC) in collaboration with the Examination Council of Lesotho (ECOL), National Task Teams/Panels, teacher training institutions, teacher associations, policy makers and educators in Lesotho identified the need for a new Curriculum that would respond to the changing demands of the education sector.

Two major developments have been the move by the country to the universal and compulsory Basic Education and the launch of the Curriculum and Assessment Policy 2009 (Education for Individual and Social Development) which advocates for integrated Basic Education Curriculum that permits persons with a wide range of abilities to benefit from educational provision at this level. The decision to implement programmes to achieve Universal Basic Education and integrated curriculum is based on an understanding that the country needs a well-educated and trained labour force for an increasingly competitive global environment. A sound secondary education foundation is imperative for further education and training and for entry in the world of work.

Science is a systematic enterprise that builds and organises knowledge in the form of testable explanations and predictions about nature and the universe. It deals with collection of techniques, methods or processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation. Science seeks to promote understanding of scientific and environmental phenomena. Biology as a science, deals with life sciences and is aimed at assisting the learners to understand systems, processes, health and their environment. It is a bases for all life science and it is imperative that all leaners who wish to pursue life sciences should do biology.

It considers the environment as a multi-dimensional concept consisting of biophysical, social, scientific, technological, political, economic, personal and contextual dimensions. It therefore concerns the understanding of scientific and environmental phenomena in terms of physical, economic, social, political and technological development and seeks to promote knowledge, skills and values pertinent to biology and technology.

Learners need to develop skills such as problem-solving, critical thinking, effective and functional communication, technological and creative skills, predicting, observing, classifying, hypothesising, experimenting, whilst gaining:

- understanding of biological and technological concepts, principles and processes for socio-economic development;

- an understanding of environmental phenomena, including the physical, socio-economic and technological dimensions of environmental issues;
- the ability to apply biological and technological skills in solving everyday life challenges; and
- positive attitudes and values towards the use of biology and technology in everyday life.

In Grade 9, the subject has designed activities in such a manner that they enable and promote the use of the scientific, investigation/inquiry and learner-centred approach. The four steps of the scientific method are observation of a phenomenon, formulation of a hypothesis, prediction of future outcomes or other phenomena, and experimentation to test the validity of the predictions. A hypothesis becomes a theory or law of nature if the experiments confirm its validity. Otherwise, it must be modified or rejected and the data further examined. Scientists postulate that the basic laws of the universe are unchangeable, and through observation and experimentation, humans determine the validity of their beliefs to better understand the nature of reality. As such teachers are encouraged to teach likewise. However, teachers can also adopt other approaches to facilitate effective and efficient teaching and learning. Teachers should ensure that activities given to learners develop the above-mentioned scientific competencies.

Certain attitudes or dispositions are also central to scientific inquiry and discovery: these include curiosity, a drive to experiment as well as a desire to challenge theories and to share new ideas and appreciate the world (Conezio & French, 2002).

TEACHING BIOLOGY

Careful selection of content, and use of a variety of approaches to teaching and learning Biology should promote understanding of:

- Biology as a discipline that sustains enjoyment and curiosity about the world and natural phenomena;
- the history of Science and the relationship between Sciences and other subjects;
- the different cultural contexts in which indigenous knowledge systems have developed;
- the contribution of Science to social justice and societal development;
- the need for using scientific knowledge responsibly in the interest of ourselves, of society and the environment; and
- the practical and ethical consequences of decisions based on Science.

AIMS

The aims of Biology as a science are to:

1. provide a worthwhile educational experience to all learners of different abilities.
2. enable learners to acquire knowledge and understanding of the scientific phenomena:
 - recognize limitations of scientific methods; and
 - become confident citizens.
3. develop abilities and skills that:
 - encourage efficient and safe practice; and
 - encourage effective communication o are useful in everyday life.
4. develop relevant attitudes and values such as:
 - objectivity;
 - integrity;
 - initiative;
 - inventiveness;
 - concern for accuracy and precision;
 - awareness; and
 - caring for the environment

OBJECTIVES

It is expected that at the end of Grade 9 learners could have:

- acquired knowledge, skills, attitudes and values that will enable them to further their studies either in the Natural Sciences or Applied Sciences.
- developed research skills to assist them acquire new knowledge.
- acquired practical skills necessary for further studies.
- developed skills that will enable them to solve day to day problems.

COMPETENCIES

At the end of Grade 9 it is expected that learners will have the following competences:

The ability to:

- observe;
- draw;
- compare;
- interpret data from different sources;
- perform experiments following instructions;
- record observations using appropriate means;
- outline methods/procedure used and results obtained;
- manipulate apparatus;
- research with minimal assistance;
- present results;
- manipulate data;
- write scientific reports;
- measure required quantities accurately;
- construct graphs and tables; and
- solve problems.

TACHING HOURS

It is recommended that the Biology be allocated 240 minutes per week comprising of four, forty (40) minutes periods and one 80 minutes period, making a total of six periods per week. The double period should be used for practical work.

GRADE 9 BIOLOGY SYLLABUS OVERVIEW.

Learning Outcomes: At the end of Grade 9, learners should be able to:

1. describe movement of substances into and out of cells.
2. describe transpiration.
3. describe translocation.
4. describe and explain enzymes.
5. describe and explain nutrition in animals.
6. describe digestion.
7. describe reproduction in humans.
8. describe development, labour, birth control and STIs.
9. describe the use, abuse and effects of drugs.

GRADE 9 BIOLOGY SYLLABUS

ACTIVITY PLAN.

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
<p>1. describe movement of substances into and out of cells.</p>	<p>Concepts Diffusion Osmosis Active transport Water potential gradient Effects of osmosis and diffusion on living tissues</p> <p>Skills Manipulation Observation Interpretation Recording Reporting Drawing</p>	<ul style="list-style-type: none"> • Teacher and learners revise parts of the cell and their functions. • Learners carry out experiments/activities to demonstrate diffusion and osmosis. • Learners observe, record and write scientific reports based on the activities. • Teacher and learners discuss observations made during activities. • Teacher and learners use charts and diagrams to explain active transport. • Teacher and learners discuss the importance of water potential gradient in the uptake of water by plants. • With the guidance of the teacher, learners carry out activities to show the effects of osmosis and diffusion on living tissue. • Teacher and learners discuss the effects of osmosis on animal and plant tissue: turgidity and plasmolysis. 	<p>define diffusion.</p> <p>define osmosis.</p> <p>define active transport.</p> <p>state examples of diffusion, osmosis and active transport in living organisms.</p> <p>describe and explain the importance of water potential gradient in the uptake of water by plants</p> <p>describe and explain the effect of osmosis in plant and animals tissue.</p> <p>discuss the importance of active transport.</p>	<p>Perfume</p> <p>Potassium permanganate</p> <p>Potato</p> <p>Onion leaves</p> <p>Charts</p> <p>Ruler</p> <p>Markers,</p> <p>Visking tubing/ cellophane tubing and any appropriate</p>

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
2. describe transpiration.	<p>Concepts Vascular bundles:</p> <ul style="list-style-type: none"> • xylem <p>Transpiration Wilting Adaptations of:</p> <ul style="list-style-type: none"> • leaves • stems • roots <p>Skills Manipulation Observation Recording using tables and graphs Reporting Interpretation Drawing</p>	<ul style="list-style-type: none"> • Teacher and learners discuss transpiration, translocation. • Teacher and learners discuss the functions of xylem and phloem. • Learners carry out experiments to demonstrate translocation and position of phloem in a plant. • Use charts, photomicrographs, prepared slides to identify position of xylem and phloem in a plant: roots, leaves and stem. • Learners carry out investigations to show water pathway through a plant using a suitable stain. • carry out experiment using a potometer to show capillarity, transpiration pull and transpiration. • use cobalt paper to prove that the liquid is water. • Relate water loss to cell surface, air spaces and stomata. • Learners construct and interpret graphs. • Learners investigate factors affecting transpiration: light intensity, temperature, humidity and air movement. • Learners discuss factors affecting the rate 	<p>define transpiration.</p> <p>state the function of xylem'</p> <p>identify positions of xylem in roots, stems and leaves.</p> <p>outline the pathway taken by water through the root, stem and leaves.</p> <p>investigate water pathway through a plant using a suitable stain.</p> <p>explain movement of water through the stem in terms of transpiration pull and capillarity effect.</p> <p>relate water loss to cell surface, air spaces and stomata.</p> <p>describe the effects of light</p>	<p>Potometer</p> <p>Suitable stains</p> <p>Charts</p> <p>Photomicrographs</p> <p>Prepared slides</p> <p>Cobalt paper</p>

		<p>of transpiration.</p> <ul style="list-style-type: none"> • Learners visit the school garden to observe plants appearance at different times of the day. • Teacher and learners discuss wilting. • Teacher and learners visit different environment to observe adaptations of roots, stems and leaves. 	<p>intensity, temperature, humidity and air movement on the rate of transpiration.</p> <p>describe how wilting occurs.</p> <p>describe how leaves, stems and roots are adapted to different contrasting environments.</p>	
--	--	---	---	--

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
3. describe translocation.	<p>Concepts Vascular bundles: phloem</p> <p>Translocation Sources and sinks</p> <p>Skills Manipulation Observation Recording using tables and graphs Reporting Interpretation Drawing</p>	<ul style="list-style-type: none"> • Teacher and learners discuss translocation. • Teacher and learners discuss the functions of phloem. • Learners carry out experiments to demonstrate translocation and position of phloem in a plant. • Use charts, photomicrographs, prepared slides to identify position of phloem in a plant: roots, leaves and stem • Teacher and learners discuss translocation of: nutrients and applied chemicals including systemic pesticides. • Learners perform activities to differentiate transport of materials from sources from sinks. 	<p>define translocation.</p> <p>state the function of xylem and phloem.</p> <p>identify positions of xylem and phloem in roots, stems and leaves.</p> <p>describe translocation of: nutrients and applied chemicals including systemic pesticides.</p> <p>compare the role of translocation and transpiration in the transport of materials from sources to sinks.</p>	<p>Charts</p> <p>Photomicrographs</p> <p>Prepared slides</p>

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
4. describe and explain enzymes.	<p>Concepts Catalyst Enzymes: Effect of pH and temperature Lock and key hypothesis Applications of enzymes</p> <p>Skills Observation Recording Manipulation Drawing Interpretation</p>	<ul style="list-style-type: none"> • With the guidance of the teacher, learners investigate catalysis. • Investigating the effect of the liver on hydrogen peroxide (enzyme catalase) or potato include control experiment. • Learners use key and lock mechanism to explain lock and key hypothesis. • Investigation of effect of temperature on enzyme activity using set ups at different temperatures. • Learners investigate effect of pH on enzyme activity using set-ups at different pH. • Learners construct temperature-time-graphs based on the effect of temperature on enzyme activity and interpret them. • Learners investigate the uses of enzymes in biological washing products. 	<p>define a catalyst.</p> <p>define an enzyme.</p> <p>explain lock and key hypothesis.</p> <p>explain the effects of temperature and pH on enzyme activity.</p> <p>construct and interpret temperature-time-graphs.</p> <p>describe uses of enzymes in biological washing products.</p>	<p>Charts/Posters</p> <p>Textbooks</p>

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
5. describe and explain nutrition in animals.	<p>Concept Nutrition Malnutrition Nutrients Balanced diet in relation to: age; sex; activity; pregnancy; lactating mother; and food tests.</p> <p>Skills Observation Manipulation Recording Presentation</p>	<ul style="list-style-type: none"> • Teacher and learners revise a balance diet, nutrients and deficiency diseases. • Teacher and learners discuss nutrition. • Teacher and learners discuss malnutrition in relation to starvation, coronary heart disease, constipation and obesity. • discuss nutrients, their mineral sources and importance: vitamin C & D, calcium, iron, fibre and water. • relate balance diet to age, sex, activity and pregnancy. • Learners carry out experiments to test for starch, reducing sugar, proteins and fats. • Learners record and report their findings. 	<p>define nutrition.</p> <p>define malnutrition.</p> <p>describe malnutrition in relation to starvation, coronary heart disease, constipation and obesity.</p> <p>list nutrients and their sources.</p> <p>describe dietary importance of nutrients.</p> <p>describe a balance diet in relation to age, sex, activity, pregnancy and lactating.</p> <p>test for starch, reducing sugar, proteins and fats.</p> <p>describe tests for starch, reducing sugar, proteins and fats.</p> <p>report findings.</p>	<p>Chemicals used for food testing</p> <p>Charts/Posters</p> <p>Heat source</p> <p>Glassware</p>

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
6. describe digestion.	<p>Concepts</p> <p>Dentition</p> <p>Ingestion</p> <p>Digestion: physical/mechanical; chemical; emulsification of fats; peristalsis</p> <p>Absorption: adaptation of small intestines; villi</p> <p>Assimilation</p> <p>Deamination</p> <p>Egestion</p> <p>Skills</p>	<p>Teacher and learners</p> <ul style="list-style-type: none"> • revise the digestive system, types of teeth and the structure of the tooth. • revise functions of each type of teeth. • use charts and posters to identify path taken by the food from the mouth to the anus. • discuss digestion of food in the mouth, the stomach and the small intestines, enzymes involved at each stage and the end products. • discuss emulsification of fats and its effect. • discuss peristalsis in relation to circular and longitudinal muscles of the alimentary canal. • describe structural adaptation of the small intestines and the structure of a villus. • discuss absorption and assimilation of food. • discuss the role of the liver in relation to digestion. • discuss the role of fat as an energy 	<p>define digestion.</p> <p>identify parts of the alimentary canal.</p> <p>state regions in the alimentary canal where amylase, protease and lipase are produced.</p> <p>state the function of each enzyme and give the substrate and end product.</p> <p>describe the process of emulsification and its effects.</p> <p>describe peristalsis in relation to longitudinal and circular muscles.</p>	<p>Charts/Posters</p> <p>Models</p>

	<p>Observation Drawing Manipulation</p>	<p>storage substance.</p>	<p>describe structural adaptation of the small intestines and the structure of a villus. define absorption and assimilation. define deamination. describe the role of the liver in relation to digestion. describe the role of fat as energy storage substance.</p>	
--	---	---------------------------	--	--

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
7. describe reproduction in humans.	<p>Concepts Reproductive hormones Menstrual cycle gametes Fertilisation Implantation</p> <p>Skills Observation Identification Drawing Presentation</p>	<p>Teacher and learners:</p> <ul style="list-style-type: none"> • revise reproductive system and secondary sexual characteristics. • discuss role of testosterone, oestrogen, luteinising hormone, follicle stimulating hormone and progesterone. • discuss the menstrual cycle. • compare gametes in terms of size, number and motility. • draw gametes. • discuss fertilization. • discuss implantation. 	<p>define sexual reproduction.</p> <p>identify hormones involved in secondary sexual characteristics development.</p> <p>describe the role of hormones in reproduction.</p> <p>describe menstrual cycle in terms of change in the uterus and ovary.</p> <p>compare gametes in terms of size, number and motility.</p> <p>draw gametes.</p> <p>outline fertilisation.</p> <p>describe effects of chemical changes during fertilisation.</p> <p>outline implantation and development of the foetus.</p>	<p>Charts/ Posters</p> <p>Models</p> <p>Textbooks</p> <p>Video Clips</p> <p>Resource person</p> <p>Internet</p> <p>Health centres</p>

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
8. describe development of foetus, labour process, birth control methods and STIs.	<p>Concepts</p> <p>Development of zygote to foetus Mitosis Functions of: Placenta Amniotic fluid Antenatal care Labour and birth Postnatal care Birth control methods: – natural; – chemical; – mechanical; – surgical. STI's</p> <p>Skills</p> <p>Observation Research Analysis Drawing Presentation Recording Comparison</p>	<p>Teacher and learners:</p> <ul style="list-style-type: none"> • discuss development of foetus including the function of placenta, amniotic fluid, amniotic sac and umbilical cord. • discuss mitosis and its role in development and growth. • discuss the processes involved in labour and birth. • Learners carry out a research on advantages and disadvantages of breastfeeding and bottle feeding (post-natal care). • Learners research on birth control methods. • Learners research cause, symptoms, signs and treatment of syphilis. • Learners present findings. 	<p>describe development.</p> <p>describe mitosis.</p> <p>describe the role of mitosis in development and growth.</p> <p>describe the functions of placenta, amniotic fluid, amniotic sac and umbilical cord.</p> <p>outline processes involved in labour.</p> <p>describe advantages and disadvantages of breastfeeding and bottle-feeding.</p> <p>describe methods of birth control and their reliability.</p> <p>state causative agents of syphilis.</p> <p>describe symptoms, signs, effects and treatment of syphilis.</p>	<p>Charts/Posters</p> <p>Internet</p>

Learning outcomes: At the end of Grade 9, learners should be able to:	Concepts , skills, values and Attitudes	Suggested learning experiences	What to assess: teacher should assess learners' ability to:	Suggested resources
<p>9. describe the use, abuse and effects of drugs.</p>	<p>Concepts Drugs: - medicinal: o antibiotics - social enjoyment: ▪ dagga; ▪ alcohol; ▪ cocaine; ▪ tobacco; ▪ heroine.</p> <p>Effects of drugs: - health - social relationship.</p> <p>Skills Research Presentation</p>	<p>Learners:</p> <ul style="list-style-type: none"> • Carry out a research on drugs. • Present research findings. • Discuss medicinal use of antibiotics, the importance of its correct use and its effects on bacteria and viruses. • discuss drugs and their social and health effects: dagga; alcohol; cocaine; and heroine. <p>Tobacco: tar; nicotine; carbon monoxide; and smoke particles.</p>	<p>define a drug.</p> <p>classify drugs.</p> <p>describe medicinal use of antibiotics.</p> <p>explain why antibiotics kill bacteria and not viruses.</p> <p>describe the effects of dagga and cocaine as drugs of abuse.</p> <p>describe effects of excessive consumption of alcohol.</p> <p>describe effects of tobacco smoke and its major toxic components.</p> <p>describe the effects of abuse of heroin.</p>	<p>Textbooks</p> <p>Internet</p> <p>Charts/posters Resource person</p> <p>Health Centres</p>

