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NATIONAL CURRICULUM STATEMENT GRADES 10-12 (GENERAL)

LEARNING PROGRAMME GUIDELINES

AGRICULTURAL SCIENCES

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CONTENTS

SECTION 1

INTRODUCTION

1.1 INTRODUCING THE NATIONAL CURRICULUM STATEMENT

1.1.1 BACKGROUND

In 1995 the South African government began the process of developing a new curriculum for the school system. There were two imperatives for this. First, the scale of change in the world, the growth and development of knowledge and technology and the demands of the 21st Century required learners to be exposed to different and higher level skills and knowledge than those required by the existing South African curricula. Second, South Africa had changed. The curricula for schools therefore required revision to reflect new values and principles, especially those of the Constitution of South Africa.

The first version of the new curriculum for the General Education Band, known as Curriculum 2005, was introduced into the Foundation Phase in 1997. While there was much to commend the curriculum, the concerns of teachers led to a review of the Curriculum in 1999. The review of Curriculum 2005 provides the basis for the development of the Revised National Curriculum Statement for General Education and Training (Grades R–9) and the National Curriculum Statement for Grades 10–12.

1.1.2 THE NATIONAL CURRICULUM STATEMENT

The National Curriculum Statement consists of 29 subjects. Subject specialists developed the Subject Statements which make up the National Curriculum Statement. The draft versions of the Subject Statements were published for comment in 2001 and then re-worked to take account of the comments received. In 2002 24 subject statements and an overview document were declared policy through Government Gazette. In 2004 five subjects were added to the National Curriculum Statement. The National Curriculum Statement now consists of the Subject Statements for the following subjects:

- Languages – 11 official languages (each counted as three subjects to cater for the three levels Home Language, First Additional Language and Second Additional Language); 13 non-official languages

- Mathematics; Mathematical Literacy; Physical Sciences; Life Sciences; Computer Applications Technology; Information Technology

- Accounting; Business Studies; Economics

- Geography; History; Life Orientation; Religion Studies

- Consumer Studies; Hospitality Studies; Tourism

- Dramatic Arts; Dance Studies; Design; Music; Visual Arts

- Agricultural Sciences, Agricultural Management Practices, Agricultural Technology

- Civil Technology; Mechanical Technology; Electrical Technology; Engineering Graphics and Design

1.1.3 NATIONAL SENIOR CERTIFICATE

The *National Senior Certificate: A Qualification on Level 4 of the National Qualifications Framework (NQF)* provides the requirements for promotion at the end of Grades 10 and 11 and the awarding of the National Senior Certificate at the end of Grade 12. This document replaces two of the original National Curriculum Statement documents: the *Overview* and the *Qualifications and Assessment Policy Framework*.

1.1.4 SUBJECT ASSESSMENT GUIDELINES

The Subject Assessment Guidelines set out the internal or school-based assessment requirements for each subject and the external assessment requirements. In addition, the *National Protocol for Recording and Reporting (Grades R-12)* (an addendum to the policy, *The National Senior Certificate*) has been developed to standardise the recording and reporting procedures for Grades R to 12. This protocol came into effect on 1 January 2007.

1.2 INTRODUCING THE LEARNING PROGRAMME GUIDELINES

1.2.1 PURPOSE AND CONTENT OF THE LEARNING PROGRAMME GUIDELINES

The Learning Programme Guidelines aim to assist teachers and schools in their planning for the introduction of the National Curriculum Statement. The Learning Programme Guidelines should be read in conjunction with the National Senior Certificate policy and the National Curriculum Statement Subject Statements.

Section 2 of the Learning Programme Guidelines suggests how teaching the particular subject may be informed by the principles which underpin the National Curriculum Statement.

Section 3 suggests how schools and teachers might plan for the introduction of the National Curriculum Statement. The Department of Education encourages careful planning to ensure that the high skills, high knowledge goals of the National Curriculum Statement are attained.

The Learning Programme Guidelines do not include sections on assessment. The assessment requirements for each subject are provided in the Subject Assessment Guidelines which come into effect on 1 January 2008.

1.2.2 WHAT IS A LEARNING PROGRAMME

INTRODUCTION

A Learning Programme assists teachers to plan for sequenced learning, teaching and assessment in Grades 10 to 12 so that all Learning Outcomes in a subject are achieved in a progressive manner. The following three phases of planning are recommended:

- Phase 1 – develop a *Subject Framework* for grades 10 to 12

- Phase 2 – develop a *Work Schedule* for each grade

- Phase 3 – develop *Lesson Plans*

It is recommended that the teachers of a subject at a school or cluster of schools first put together a broad subject outline (Subject Framework) for the three grades to arrive at an understanding of the content of the subject and the progression which needs to take place across the grades (see Section 3.3.1). This will assist with the demarcation of content for each grade. Thereafter, teachers of the subject teaching the same grade need to work together to develop a year long Work Schedule. The Work Schedule should indicate the sequence in which the content and context will be presented for the subject in that particular grade (see Section 3.3.2). Finally, individual teachers should design Lesson Plans using the grade-specific Work Schedule as the starting point. The Lesson Plans should include learning, teaching and assessment activities that reflect the Learning Outcomes and Assessment Standards set out in the Subject Statements (see Section 3.3.3). Learning Programmes should accommodate diversity in schools and classrooms but reflect the core content of the national curriculum.

An outline of the process involved in the design of a Learning Programme is provided on page 6.

DESIGNING A LEARNING PROGRAMME

A detailed description of the process involved in the design of a Learning Programme is provided in Sections 3.3.1 – 3.3.3 of the Learning Programme Guidelines. The first stage, the development of a Subject Framework does not require a written document but teachers are strongly advised to spend time with subject experts in developing a deep understanding of the skills, knowledge and values set out in the Subject Statements. The quality and rigour of this engagement will determine the quality of teaching and learning in the classroom.

Once the Subject Framework has been completed, teachers should develop Work Schedules and Lesson Plans. Examples of Work Schedules and Lesson Plans are provided in the Learning Programme Guidelines. Teachers are encouraged to critically engage with these formats and develop their own.

Developing a Subject Framework (Grades 10-12)

Planning for the teaching of subjects in Grades 10 to 12 should begin with a detailed examination of the scope of the subject as set out in the Subject Statement. No particular format or template is recommended for this first phase of planning but the steps recommended should be used as a checklist.

Although no prescribed document is required for this stage of planning, school-wide planning (timetables, requisitioning, teacher development, classroom allocation) as well as the development of grade-specific work schedules would benefit from short documents which spell out:

- The scope of the subject – the knowledge, skills and values; the content; the contexts or themes; electives etc. to be covered in the three grades for each subject
- A three-year assessment plan for the subject
- The list of LTSM required for the subject

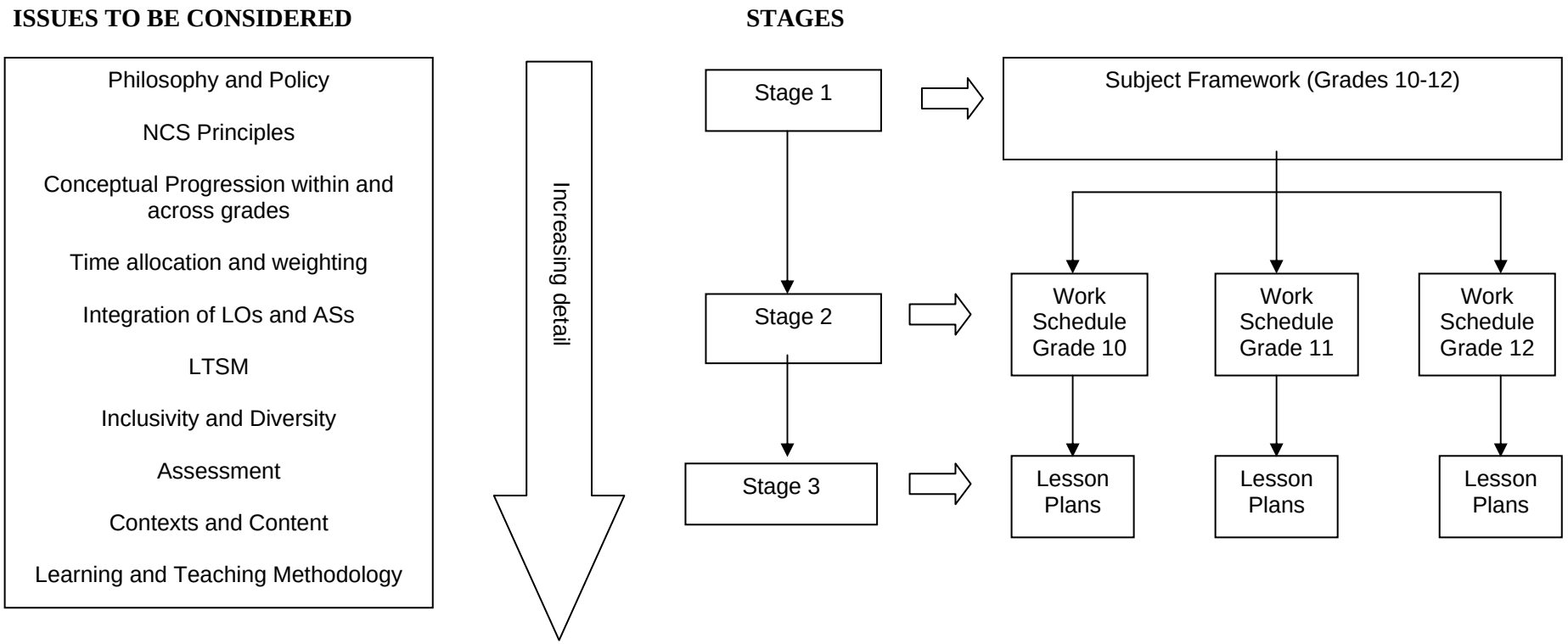
Designing Work Schedules

This is the second phase in the design of a Learning Programme. In this phase teachers develop Work Schedules for each grade. The Work Schedules are informed by the planning undertaken for the Subject Framework. The Work Schedules should be carefully prepared documents that reflect what teaching and assessment will take place in the 36-40 weeks of the school year.

Designing Lesson Plans

Each grade-specific Work Schedule must be divided into units of deliverable learning experiences, that is, Lesson Plans. Lesson Plans are not equivalent to periods in the school timetable and each contains a coherent series of teaching, learning and assessment activities. A Lesson Plan adds to the level of detail for each issue addressed in the Work Schedule. It also indicates other relevant issues to be considered when teaching and assessing a subject.

FIGURE 1: RELATIONSHIP BETWEEN THE 3 STAGES OF PLANNING WHEN DEVELOPING A LEARNING PROGRAMME



SECTION 2

INTRODUCING AGRICULTURAL SCIENCES

2.1 WHAT IS AGRICULTURAL SCIENCES?

Agricultural Sciences is the study of the relationship between soils, plants and animals to produce and process food, fibre, fuel and any other agricultural commodities that have an economic, aesthetic and cultural value.

The knowledge, skills and values acquired in this subject enable learners to understand the application of appropriate technology in commodity production (animal and plant) and processing in a manner that will ensure sustainable agriculture.

Agricultural Sciences consists of soil science (components, forming, characteristics, organic matter, chemical and colloidal characteristics, classification and soil microbiology), plant science (nutrition, reproduction and propagation, breeding, protection and classification), animal science (nutrition, reproduction and propagation, breeding, protection and classification), agricultural economics, basic chemistry, basic biological concepts, sustainable natural resource utilisation and management of the environment.

The following are covered in Agricultural Sciences:

- basic concepts and Agriculture as a primary and secondary industry
- establishment and reproduction
- maintenance/care and production
- soil science
- basic agricultural genetics
- harvesting, value adding and marketing
- agricultural management as an entrepreneurial skill

2.2 WHAT IS THE PURPOSE OF AGRICULTURAL SCIENCES?

The interdependence of people and natural resources and the increasing demand on the latter by proper use, management and conservation of agricultural and natural resources is of paramount importance in Southern Africa.

Relevant education at secondary school level can contribute to meeting these demands in a sustainable way. The appreciation and awareness of and responsibility for natural resources and their interaction with people should be fostered during Grades R-9 through the Natural Sciences Learning Area.

Agricultural Sciences provides learners with the relevant knowledge, skills and values to appreciate the increasing demand for food, fibre and aspirations of communities.

2.3 WHAT IS THE RELATIONSHIP BETWEEN AGRICULTURAL SCIENCES AND THE NATIONAL CURRICULUM STATEMENT PRINCIPLES?

As South Africa moves into a new political era in which accelerated economic growth and development are promoted, new policies on land use and land ownership have been developed. A new approach to Agricultural education is required to address these political, social, economic and environmental conditions.

The subject Agricultural Sciences should equip individuals with the knowledge and necessary skills to enable them to make sound decisions based on the principles of sustainable agriculture and living.

The Constitution of the Republic of South Africa (Act 108 of 1996) provided a basis for curriculum transformation and development in South Africa. The National Curriculum Statement Grades 10-12 (General) provides a foundation for the achievement of these goals through the Learning Outcomes and Assessment Standards. The Agricultural Sciences Subject Statement supports the application of the nine principles of the National Curriculum Statement as follows:

2.3.1 Social transformation

Agricultural Sciences will achieve social transformation through the development of the potential of the learner and the removal of artificial barriers to the attainment of qualifications within an agricultural environment. Agricultural Sciences aims to expose learners to the various principles in the production of food whether for subsistence or profit. Emphasis will be placed on national priorities within agriculture.

2.3.2 Outcomes-Based Education

Agricultural Sciences makes use of Learning Outcomes and Assessment Standards to describe what a learner should know and be able to demonstrate i.e. the skills, knowledge, and values that are the results of learning. Agricultural Sciences builds its Learning Outcomes for Grades 10-12 on the Critical and Developmental Outcomes that were inspired by the Constitution.

2.3.3 High knowledge and high skills

Agricultural Sciences aims at developing knowledge and mastering of production, processing and research skills in learners. It sets up high expectations of what all South African learners can achieve.

2.3.4 Integration and applied competence

Integration within a subject involves the grouping of Assessment Standards that link naturally. Integration should be used to enrich learning, teaching and assessment. Agricultural Sciences allows for an integrated approach to learning, teaching and assessment in that the issues dealt with in the subject are integrated across the four Learning Outcomes of the subject. Agricultural Sciences seeks to promote applied competence and aims at integrating three discrete competences- namely practical, foundational and reflective competences.

2.3.5 Progression

Progression in Agricultural Sciences refers to the process of developing more advanced and complex knowledge and skills. The progression across the grades is reflected in the degree of complexity of the content and context. Each Learning Outcome is followed by an explicit statement of the level of performance expected for the outcome per grade.

2.3.6 Articulation and Portability

Agricultural Sciences in Grades 10-12 links the exit levels of the General Education and Training (GET) Band and the entrance levels of careers within Agriculture and Higher Education and Training (HET).

2.3.7 Human Rights, Inclusively, Environmental and Social Justice

Agricultural Sciences acknowledges that all learners should be able to develop to their full potential provided they receive the necessary support. The intellectual, social, emotional, spiritual and physical needs of learners will be addressed through the design and development of appropriate Learning Programmes and through the use of appropriate assessment instruments.

2.3.8 Valuing Indigenous Knowledge Systems

With IKS (Indigenous Knowledge Systems) people recognize the wide diversity of knowledge systems through which people make sense of and attach meaning to the world in which they live. In the South African context IKS refer to a body of knowledge embedded in African philosophical thinking and social practices that have evolved over thousands of years.

2.3.9 Credibility, quality and efficiency

Agricultural Sciences as offered in South African schools, is comparable with other progressive countries. The Subject Statement, developed in consultation with local and international specialists, encapsulates the essence of progressive international thinking, adapted to South African conditions.

2.4 PROFILE OF AN AGRICULTURAL SCIENCES LEARNER ENTERING GRADES 10-12

Learners who are in grade 9 have been exposed to 8 Learning Areas in the NCS Grades R-9. One Learning Area is Natural Sciences. Natural Sciences consist of THREE Learning Outcomes and FOUR content strands, namely *Earth and Beyond*, *Energy and Change*, *Matter and Material* and *Life and Living*.

These four content strands lead on to aspects of Physical Sciences, Life Sciences, Geography and Agricultural Sciences respectively in Grades 10-12.

The following skills and concepts which are addressed in the Natural Sciences Learning Area in Grades 4-9 link directly to agricultural concepts:

The affective domain (Values)

- love and appreciation for soil, plants and animals.
- sense of responsibility for the conservation of natural resources
- positive attitude towards agriculture.

The cognitive domain (Knowledge)

- awareness of the interdependence of people and natural resources
- elementary principles of agriculture

The psychomotor domain (Skills)

- elementary hands-on skills

These principles as developed in Grades R-9 should be built on to achieve the following in Grades 10, 11 and 12 in Agricultural Sciences:

The affective domain (Values)

- sensitise the learner towards the importance of agriculture
- indicate responsibility for and commitment to the country's resources
- develop an interest in agriculture
- inculcate enthusiasm for the science of agriculture amongst learners
- develop a positive attitude and a sense of responsibility towards the primary and secondary agricultural industry
- develop sound work ethics
- develop a positive attitude towards Human Rights and Inclusivity, indigenous knowledge systems and HIV/AIDS

The cognitive domain (Knowledge)

- acquire scientific knowledge of agriculture
- prepare learners for possible further studies
- introduce planning
- proficiency in problem solving
- strategic thinking
- analytical thinking through a scientific approach.

The psychomotor domain (Skills)

- observe accurately
- basic hands-on skills in the required agricultural processes
- conduct surveys
- record, analyse and interpret data from surveys
- entrepreneurial skills.

In Agricultural Sciences in Grades 10-12, a learner develops entrepreneurial skills and therefore can proceed into higher education or go into farming related practices using the skills acquired. Agricultural Sciences It can also lead to the following Higher Education study: Veterinary Medicine, Geology, Agriculture, Engineering, Management Sciences, Life and Physical Sciences, Food Science, Food Technology, Consumer Science, Environmental / Natural Resource Management, Dietetics and Rural Development. It leads to careers in farming, horticulture, agricultural teaching, and extension officers in agriculture, marketing services and agricultural business using entrepreneurial skills.

The table below relates the Learning Outcomes of the Learning Area Natural Sciences in Grades R-9 to the Agricultural Sciences subject for Grades 10-12:

NCS Grades R-9: Natural Sciences	NCS Grades 10-12: Agricultural Sciences
LO 1 Scientific Process	LO 1 Investigate and Analyse
LO 2 Scientific knowledge	LO 2 Sustainable Agriculture Practices LO 3 Indigenous Agricultural Knowledge and Historical Development
LO 3 Science and Society	LO 4 Interrelated Issues in Agriculture

2.5 RELATIONSHIP BETWEEN AGRICULTURAL SCIENCES LEARNING OUTCOMES AND CRITICAL AND DEVELOPMENTAL OUTCOMES

The following table shows how the Agricultural Sciences Learning Outcomes link up with the Critical and Developmental Outcomes:

TABLE 2.1: RELATIONSHIP BETWEEN AGRICULTURAL SCIENCES LEARNING OUTCOMES AND THE CRITICAL AND DEVELOPMENTAL OUTCOMES, AND EXAMPLES OF APPLICATION IN AGRICULTURAL SCIENCES

Critical Outcomes	Examples of Application in Agricultural Sciences	Agricultural Sciences LOs
Identify and solve problems and make decisions using critical and creative thinking.	Evaluate and identify different strategies to combat the adverse effects of the EL Nino weather patterns on crop yield.	1 and 4
Work effectively with others as members of a team, group or organisation and community.	Agricultural Sciences enables learners to work effectively with Local, National and International nature conservation organisations such as the International Conservation Union (ICU) whereby they share ideas and concepts for the development and maintenance of the environment.	1 and 4
Organise and manage themselves and their activities responsibly and effectively.	Agricultural Sciences learners are self-disciplined, able to plan, organise and manage their work, keep to time schedules, committed to the task at hand and take responsibility for their actions. In addition the learners will be able to work under pressure in order to maximize crop yield and production.	2 and 3
Collect, analyse, organise and critically evaluate information.	Learners are able to observe and record data accurately so that they are able to analyse, interpret and critically evaluate information and apply it to the theory and practice of Agricultural Sciences, e.g. learners should be able to compare the advantages and disadvantages of organic foods to genetically modified foods.	1
Communicate effectively using visual, symbolic and/or language skills in various modes.	Learners can communicate through verbal, non - verbal and symbolic language forms that characterize the Agricultural Sciences field.	2 and 3
Use science and technology effectively and critically **showing responsibility** towards the environment and the health of others.	Agricultural Sciences concepts and principles should demonstrate effective social, ethical and environmental responsibility. An example of this is when learners can provide effective veld management practices.	2 and 3

Critical Outcomes	Examples of Application in Agricultural Sciences	Agricultural Sciences LOs
Demonstrate an understanding of the world as a set of related systems by recognising that **problem solving contexts do not exist in isolation.**	Agricultural Sciences enables learners to understand how their own problem solving activities are influenced by, or may impact on, local, national and global contexts. In this context learners will be able to see how world agricultural conservation legislation and policies have influenced our local conservation policies.	1 and 4

Developmental Outcomes	Examples of Application in Agricultural Sciences	Agricultural Sciences LOs
Reflect and explore a variety of strategies to learn more effectively.	Learners will be able to explore a variety of techniques and methods to implement in the agricultural production sector, e.g. explore the latest trends in milk production or in wine making.	2 and 3
Participate as **responsible citizens** in the life of local, national and global communities.	Agricultural Sciences will enable learners to utilize natural resources effectively and efficiently. An example is that learners will be able to devise useful and productive water management programmes for their communities. Learners will also explore avenues of preserving and beautifying their local environments and hence uplift their communities.	4
Be **culturally and aesthetically sensitive** across a range of social contexts.	Agricultural Sciences can be an agent for social transformation. Learners will learn to appreciate and respect how different cultural practices and indigenous knowledge have shaped agricultural processes across the world. An example is the making of traditional African Beer.	2, 3 and 4
Explore education and career opportunities.	The Agricultural Sciences learner will gain the skills, knowledge and confidence to pursue both professional and vocational opportunities in the agricultural field. In addition there are also a lot of research opportunities in the agricultural science field. South Africa provides opportunities in the fishing, wine and food making industries.	1
Develop **entrepreneurial** opportunities.	Agricultural Sciences enables learners to become commercial or subsistence farmers. In addition learners can become consultants in the agricultural field.	1, 2, 3 and 4

Consult the Subject Statements for Agricultural Sciences for more information on Learning Outcomes and Assessment Standards.

2.6 WAYS TO ACHIEVE AGRICULTURAL SCIENCES LEARNING OUTCOMES

Activity-based learning should be used to achieve the Agricultural Sciences Learning Outcomes. The Work Schedule for each grade should guide the learning process to achieve the required outcomes. Assessment Standards should ensure that the activities are aligned towards the envisaged achievement of knowledge, skills and values.

2.6.1 Learning Outcomes

Learning Outcomes are used to develop knowledge, skills and values. Assessment Standards are used to indicate the content and context to achieve the desired outcomes.

Learning Outcome 1: Investigate and Analyse

The learner is able to investigate, critically analyse and understand the challenging nature of agriculture, in order to plan and solve problems relating to sustainable agriculture.

The focus of this Learning Outcome is the various skills needed to access, process and use information to meet the challenges of maintaining the balance between agriculture and the environment. It involves knowledge of and the skills required for handling basic agricultural machinery and equipment so as to solve agricultural problems in a sustainable way.

In Grade 10 learners handle basic agricultural machinery and equipment safely and efficiently and explore the use of agricultural equipment and technology so as to explain how to obtain an optimum yield without disturbing the ecological balance of the environment.

In Grade 11 learners use the knowledge of and skills of handling agricultural machinery and equipment and technology to meet the challenges of problems related to agriculture. The learner is beginning to anticipate problems and, with guidance, can work out solutions.

In Grade 12 learners use the knowledge of and skills of handling basic agricultural machinery and equipment and technology to meet the challenges of a wide range of problems related to agriculture. The learner is able, independently or in groups, to hypothesise and predict problems as well as to find ecologically sustainable solutions.

Learning Outcome 2: Sustainable Agricultural Practices

The learner is able to demonstrate an understanding of the dynamic nature of agricultural knowledge and of the appropriate technology, and to interpret and apply this knowledge to Agricultural Sciences, and systems to ensure a sustainable agricultural environment.

This Learning Outcome addresses the dynamic nature of agriculture as it applies to relevant production, processing and marketing practices to sustain agriculture in a manner that does not destroy the environment.

In Grade 10 learners explain the role of ecology and the influence on production as well as basic agricultural concepts in soil, animal and plant production. The learner is introduced to the role of organised agriculture in South Africa and the ecological regions of the world and of South Africa in particular.

In Grade 11 learners are introduced to all relevant aspects of soil in the production of crops as well as factors that influence crop production; the impact of weather and population shift on agricultural production and on the use of natural and agricultural resources for optimum production.

In Grade 12 learners are introduced to the aspects of animal science that influence animal production, management practices, and the scope for using entrepreneurial skills in the agricultural environment.

Learning Outcome 3: Indigenous Agricultural Knowledge and Historical Development

The learner is able to understand and interpret socio-cultural developments in agriculture over time, and use indigenous agricultural knowledge in relevant management practices, systems and technologies.

The focus of this outcome is on the changes in agricultural practice that have occurred and, in particular, on the understanding of indigenous agricultural knowledge in order to incorporate all relevant practices, systems and technologies in managing a sustainable agricultural environment.

In Grade 10 learners investigate the nature of agriculture in South Africa and the role that agricultural industries play in providing economic stability in the country's agricultural practices.

In Grade 11 learners investigate the changes that have taken place in agricultural practice over time, as well as explain the indigenous agricultural knowledge that has influenced production practices. The learner becomes aware of the need to use natural resources in a sustainable manner and outlines the issues involved in sustainability, explaining the ways in which various agricultural practices have affected natural resources in the past.

In Grade 12 learners investigate the agricultural labour market and the reasons for the continual development of Agricultural commodities to maintain sustainable development. The learner becomes aware of and can explain the changing patterns of agricultural practices and the labour issues involved in the different practices.

Learning Outcome 4: Interrelated Issues in Agriculture

The learner is able to demonstrate an understanding of the links between man and nature and the impact of socio-economic and political issues on natural resources and on sustainable agricultural production.

Learners need to be sensitive towards their natural environment and understand the socio-economic and political conditions, which have an impact on the environment and on sustainable agricultural production.

In Grade 10 learners are able to understand and explain the role of legislation on agricultural resources. They can also describe the impact of diseases on agricultural production.

In Grade 11 learners investigate the importance of conducting agricultural practices in an ethical and cultural manner, valuing inclusivity and human rights. The learner is able to analyse the impact of global agriculture on local production and the influence of poverty, wealth, and legislation on agricultural practices.

In Grade 12 learners are introduced to the importance of having equitable access to agricultural resources, and to interpret legislation for the utilisation of agricultural resources in order to sustain agricultural practice in a responsible manner.

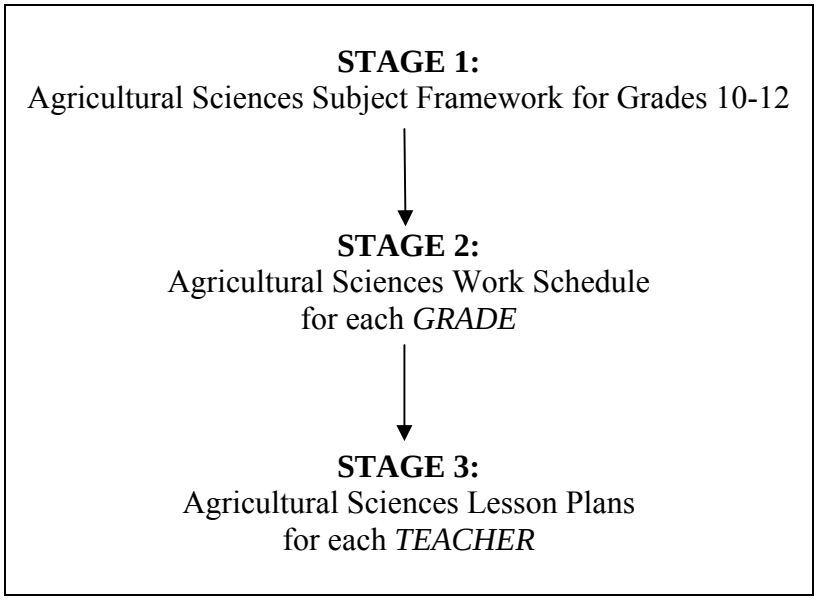
SECTION 3

DESIGNING A LEARNING PROGRAMME FOR AGRICULTURAL SCIENCES

3.1 INTRODUCTION

A Learning Programme is a tool to plan for sequenced learning, teaching and assessment across Grades 10-12 so that all four Learning Outcomes in Agricultural Sciences are achieved in a progressive manner. It is recommended that the Agricultural Sciences teachers at a school first put together a broad subject outline (i.e. Subject Framework) for Grades 10-12 to arrive at an understanding of the progression which needs to take place across the grades (see Section 3.3.1). This will assist with the demarcation of content for each grade. Thereafter, Agricultural Sciences teachers teaching the same grade need to work together and draw from the content and context identified for their grade in the Subject Framework, to develop a Work Schedule in which they indicate the sequence in which the content and context will be presented for Agricultural Sciences in that particular grade (see Section 3.3.2). Finally, the individual Agricultural Sciences teacher should design Lesson Plans using the grade-specific Work Schedule as the starting point. The Lesson Plans should include learning, teaching and assessment activities (see Section 3.3.3).

An outline of the process involved in the design of a Learning Programme for Agricultural Sciences is provided in the diagram below:



The process to be followed in the development of a Learning Programme is not a neatly packaged sequence of numbered steps that follow one another in a particular order. Teachers may find themselves moving back and forth in the process as they plan and critically reflect on decisions taken before moving on to the next decision in the process. The process is therefore not strictly linear and is reflective in nature. For this reason the steps provided in this Section are a guide and should be used as a checklist in the planning process.

3.2 ISSUES TO ADDRESS WHEN DESIGNING A LEARNING PROGRAMME

The issues to be addressed in the development of an Agricultural Sciences Learning Programme are presented in a tabular format to indicate the implications of each issue at each of the three stages of the development of a Learning Programme:

- Stage 1 – Subject Framework
- Stage 2 – Work Schedule
- Stage 3 – Lesson Plan

3.2.1 Policies and Principles

STAGE 1 Subject Framework **STAGE 2 Work Schedule** **STAGE 3 Lesson Plan**	The various Policies that impact on curriculum implementation should be considered throughout the planning process. *NCS:* • Principles: Refer to Section 2.3 to see how Agricultural Sciences supports the application of the nine principles of the NCS • Critical and Developmental Outcomes: Refer to Section 2.5 to see how Agricultural Sciences supports the application of the Critical and Developmental Outcomes *Other Policies and Legislation:* • White Paper 6, Language in Education Policy, Religion and Education Policy, HIV/AIDS Policy– all have implications for LTSM and teaching methods in Agricultural Sciences • White Paper 7 – gives an indication on the use of computers in the classroom and therefore has implications for LTSM and teaching methods in Agricultural Sciences

3.2.2 Content

In the NCS Grades 10-12 content means the combination of knowledge, skills and values.

STAGE 1 Subject Framework	The content is provided by the ASs. These give an indication of the knowledge, skills and values (KSVs) to be covered in each of the three grades. The Subject Framework sets out the content for the three years (i.e. Grades 10, 11 and 12).
STAGE 2 Work Schedule	The Work Schedule sets out the content for one year. Here the focus falls on the grade-specific KSVs required by the NCS.
STAGE 3 Lesson Plan	The Lesson Plans set out the content to be covered in each coherent series of learning, teaching and assessment activities. Each Lesson Plan can be one or more weeks in duration.

3.2.3 Integration

Integration involves the grouping of Assessment Standards according to natural and authentic links.

STAGE 1 Subject Framework	Integration within the subject should be considered in broad terms during discussions at this stage. All Grade 10-12 teachers should consider integration of ASs within and across the grades.
STAGE 2 Work Schedule	The integration and sequencing of the ASs is undertaken in the Work Schedule to ensure that all ASs for a particular grade are covered in the 40-week contact period.
STAGE 3 Lesson Plan	The same groupings of LOs and ASs as arrived at in the Work Schedule should be used to develop a coherent series of learning, teaching and assessment activities for each Lesson Plan.

3.2.4 Conceptual Progression

STAGE 1 Subject Framework	The Subject Framework should indicate the increasing depth of difficulty across Grades 10-12. Progression across the three grades is shown in the ASs per Learning Outcome.
STAGE 2 Work Schedule	Progression in a grade is evident in the increasing depth of difficulty in that particular grade. Grade-specific progression is achieved by appropriately sequencing the groupings of integrated LOs and AS in the Work Schedule.
STAGE 3 Lesson Plan	In the individual Agricultural Sciences classroom increasing depth of difficulty is shown in the activities and Lesson Plans. Progression is achieved by appropriately sequencing the activities contained within each Lesson Plan and in the series of Lesson Plans.

3.2.5 Time Allocation and Weighting

STAGE 1 Subject Framework	4 hours per week is allocated to Agricultural Sciences in the NCS. This is approximately 160 hours per year. The teachers of the subject should plan how this time will be used for the teaching of Agricultural Sciences in the three grades.
STAGE 2 Work Schedule	The groupings of ASs as arrived at in the integration process should be paced across the 40 weeks of the school year to ensure coverage of the curriculum.
STAGE 3 Lesson Plan	The amount of time to be spent on activities should be indicated in the Lesson Plans.

3.2.6 LTSM

LTSM refers to any materials that facilitate learning and teaching. LTSM need to be chosen judiciously because they have cost implications for the school and the learner. The NCS provides scope for the use of a variety of resources. All teachers and learners must have a textbook. However, teachers are required to go beyond the textbook. They do not necessarily need exotic, specialised materials. Rather common and readily available items can be used.

STAGE 1 Subject Framework	Compile a list of general LTSM (text books and other resources) that will be necessary and useful in the teaching, learning and assessment of the content. This assists with the requisition and availability of LTSM at a school.
STAGE 2 Work Schedule	List grade-specific LTSM (resources) required in the learning, teaching and assessment process for the grade.
STAGE 3 Lesson Plan	Identify specific resources related to the individual activities contained within a Lesson Plan.

3.2.7 Assessment

All grade 10 and 11 learners are expected to complete 7 assessment tasks including a Performance Assessment Task. All grade 12 learners are expected to complete 8 assessment tasks including an external examination and a Performance Assessment Task. See section 3 of the Subject Assessment Guidelines for Agricultural Sciences for more information.

In order to administer effective assessment one must have a clearly defined purpose. It is important that all the tasks are well covered as spelt out in the Subject Assessment Guideline document. By answering the following questions the teacher can decide what assessment activity is most appropriate:

- What concept, skill or knowledge needs to be assessed?
- What should the learners know?
- At what level should the learners be performing?
- What type of knowledge is being assessed: reasoning, memory or process?

Observation-based assessment requires that learner performance be assessed while the learner is actually performing a skill in the classroom as there will be no concrete product for the teacher to assess after the performance. Not all observations need culminate in a formally recorded assessment of learner performance. **Performance-based** assessment relies on the availability of a product as evidence of learner performance that can be assessed by the teacher after the completion of the performance. Test-based assessment focuses on assessing the presentation and application of knowledge.

STAGE 1 Subject Framework	Develop a three-year assessment plan using the Subject Assessment Guidelines for Agricultural Sciences. This should ensure the use of a variety of assessment forms relevant to the subject and progression across the three grades.
STAGE 2 Work Schedule	Use the Subject Assessment Guidelines for Agricultural Sciences to develop a grade-specific assessment plan. The forms of assessment listed must facilitate the achievement of the particular LOs and ASs in each grouping.
STAGE 3 Lesson Plan	Indicate more classroom-specific assessment strategies, by mentioning the methods, forms and tools that will be used to assess learner performance in each activity. HINT: Not all activities need to be assessed – some may just be introductory in nature or for enrichment. The choice of an assessment strategy is determined by the LOs and ASs that have been grouped together for a particular Lesson Plan. The assessment strategy chosen must facilitate the achievement of these particular LOs and ASs in the classroom.

3.2.8 Inclusivity and Diversity

The following steps can be taken to effectively address diversity in the classroom when planning Agricultural Sciences teaching activities:

- consider individual past experiences, learning styles and preferences;
- develop questions and activities that are aimed at different levels of ability;
- provide opportunity for a variety of participation levels such as individual, pairs and small group activities;
- consider the value of individual methods ; and
- assess learners based on individual progress.

STAGE 1 Subject Framework	Teachers should be sensitive to inclusivity and diversity when identifying content, teaching styles and methods, forms of assessment and LTSM (Resources). Diversity should be accommodated in the following areas:
STAGE 2 Work Schedule	• Learning styles: provide optional activities / different ways of doing same activity • Pace of learning: provide for both slower and faster learners by providing optional extra activities, reading or research, as well as multiple assessment opportunities • Differences in levels of achievement: provide optional extra activities, challenges and materials that cater for these differences between learners. • Gender diversity: ensure that teachers do not inadvertently allow or contribute towards discrimination against boys or girls in the classroom on the basis of gender. • Cultural diversity: recognise, celebrate and be sensitive when choosing content, assessment tasks and LTSM.
STAGE 3 Lesson Plan	This is catered for as EXPANDED OPPORTUNITIES in the Lesson Plan. Enrichment is provided for high achievers and remediation or other relevant opportunities for learners requiring additional support. It is not necessary to develop an activity to cater for each type of diversity which arises in the classroom. Teachers may find it possible to cater for different diversities within one activity with effective planning.

3.2.9 Learning and Teaching Methodology

STAGE 1 Subject Framework	It is not necessary to record Teaching Methods for either of these stages.
STAGE 2 Work Schedule	
STAGE 3 Lesson Plan	This is catered for as TEACHING METHOD in the Lesson Plan. It provides an indication of how teaching and learning will take place, that is, how each activity will be presented in the classroom.

3.3 DESIGNING A LEARNING PROGRAMME

A detailed description of the process involved in the design of a Learning Programme for Agricultural Sciences is provided in this section (see Sections 3.3.1 – 3.3.3). The process presented here is a suggestion of how to go about designing a Learning Programme.

3.3.1 Subject Framework (Grades 10-12) for Agricultural Sciences

Planning for the teaching of Agricultural Sciences in Grades 10 to 12 should begin with a detailed examination of the scope of the subject as set out in the Subject Statement. No particular format or template is recommended for this first phase of planning but the five steps provided in Table 3.1 should be used as a checklist.

Although no prescribed document is required for this stage of planning, school-wide planning (timetables, ordering, teacher development, classroom allocation) as well as the development of grade-specific work schedules would benefit from short documents which spell out:

- The scope of the subject – the knowledge, skills and values; the content; the contexts or themes; electives etc. to be covered in the three grades (see Annexure 1)
- A three-year assessment plan
- The list of LTSM required

3.3.2 Designing Work Schedules for Agricultural Sciences

This is the second phase in the design of a Learning Programme. In this phase teachers develop Work Schedules for each grade. The Work Schedules are informed by the planning undertaken for the Subject Framework. The Work Schedules should be carefully prepared documents that reflect what teaching and assessment will take place in the 40 weeks of the school year. Table 3.1 provides steps on how to approach the design of a Work Schedule. See Annexure 2 for examples of Work Schedules for Grades 10, 11 and 12.

3.3.3 Designing Lesson Plans for Agricultural Sciences

Each grade-specific Work Schedule for AGRICULTURAL SCIENCES must be divided into units of deliverable learning experiences, that is, Lesson Plans. A Lesson Plan adds to the level of detail in the Work Schedule. It also indicates other relevant issues to be considered when teaching and assessing Agricultural Sciences.

A Lesson Plan is not equivalent to a subject period in the school timetable. Its duration is dictated by how long it takes to complete the coherent series of activities contained in it.

Table 3.1 provides steps on how to approach the design of Lesson Plans.

3.3.4 Reflection and review of the Agricultural Sciences Learning Programme

After the Learning Programme has been delivered by means of Lesson Plans in the classroom, the teacher should reflect on what worked, how well it worked and what could be improved. Teachers need to note these while the experience is still fresh in their minds, so that if necessary, they can adapt and change the affected part of the Agricultural Sciences Learning Programme for future implementation. It is advisable to record this reflection on the Lesson Plan planning sheets.

TABLE 3.1: STEPS FOR THE DESIGN OF A LEARNING PROGRAMME FOR AGRICULTURAL SCIENCES

	Subject Framework for Agricultural Sciences (Grades 10-12)	Work Schedule for Agricultural Sciences (per grade)	Lesson Plans for Agricultural Sciences
Step 1	**Clarify the Learning Outcomes and Assessment Standards.** The essential question for Agricultural Sciences is: What Learning Outcomes do learners have to master by the end of Grade 12 and what Assessment Standards should they achieve to show that they are on their way to mastering these outcomes? All learning, teaching and assessment opportunities must be designed down from what learners should know, do and produce by the end of Grade 12. The Learning Outcomes and Assessment Standards that learners should master by the end of Grade 12 are specified in the Agricultural Sciences Subject Statement.	**Package the content.** Study the Learning Outcomes and Assessment Standards prescribed for the particular grade in Agricultural Sciences and group these according to natural and authentic links.	**Indicate the content, context, Learning Outcomes and Assessment Standards.** Copy this information from the Work Schedule for the particular grade.
Step 2	**Study the conceptual progression across the three grades.** Study the Assessment Standards for Agricultural Sciences across the three grades. Progression should be clearly evident across the grades.	**Sequence the content.** Determine the order in which the groupings of Learning Outcomes and Assessment Standards will be presented in the particular grade in Agricultural Sciences. Besides the conceptual progression in the Assessment Standards for Agricultural Sciences, context can also be used to sequence groupings in Agricultural Sciences.	**Develop activities and select teaching method.** Decide how to teach the Learning Outcomes and Assessment Standards indicated in Step 1 and develop the activity or activities that will facilitate the development of the skills, knowledge and values in the particular grouping. Thereafter, determine the most suitable teaching method(s) for the activities and provide a description of how the learners will engage in each activity.

	Subject Framework for Agricultural Sciences (Grades 10-12)	Work Schedule for Agricultural Sciences (per grade)	Lesson Plans for Agricultural Sciences
Step 3	**Identify the content to be taught.** Analyse the Assessment Standards to identify the skills, knowledge and values to be addressed in each grade. Also consider the content and context in which they will be taught.	**Pace the content.** Determine how much time in the school year will be spent on each grouping of Learning Outcomes and Assessment Standards in the particular grade.	**Consider diversity.** Explore the various options available within each activity that will allow expanded opportunities to those learners that require individual support. The support provided must ultimately guide learners to develop the skills, knowledge and values indicated in the grouping of Learning Outcomes and Assessment Standards.
Step 4	**Identify three-year plan of assessment.** Use the Subject Assessment Guidelines to guide the three-year assessment plan. Consider what forms of assessment will be best suited to each of the Learning Outcomes and Assessment Standards. This ensures that assessment remains an integral part of the learning and teaching process in Agricultural Sciences and that learners participate in a range of assessment activities. See Subject Assessment Guidelines.	**Review forms of assessment.** Revisit the forms of assessment listed for the particular grade in the Subject Assessment Guidelines, and refine them to address each grouping of Learning Outcomes and Assessment Standards as developed in Step 1. See Subject Assessment Guidelines.	**Review assessment and LTSM.** Indicate the details of the assessment strategy and LTSM to be used in each activity.
Step 5	**Identify possible LTSM (resources).** Consider which LTSM will be best suited to the learning, teaching and assessment of each Learning Outcome in the three grades using the Assessment Standards as guidance.	**Review LTSM.** Revisit the LTSM (resources) listed for the particular grade in the Subject Framework, and refine them to address each grouping of Learning Outcomes and Assessment Standards as developed in Step 1.	**Allocate time.** Give an indication of how much time will be spent on each activity in the Lesson Plan.

ANNEXURE 1: CONTENT FRAMEWORK FOR AGRICULTURAL SCIENCES

The following tables provide an indication of the content that should be addressed in each of Grades 10, 11 and 12.

Grade 10

KNOWLEDGE AREA	CONTENT
Agro-ecology	• Ecological regions of the world: outline of various regions. • Ecological regions in South Africa: geographical distribution and veld types. • Adaptations to ecosystems: ▪ adaptations of animals to specific regions; ▪ effect of weather phenomena (e.g. El Niño). • Veld management: ▪ foundation of the livestock industry; ▪ principles of utilisation.
Agri-industry	• Key importance: provider of food, raw materials, jobs, economic stability. ▪ Demand for foodstuffs: determined by natural resources. ▪ Overview of agricultural development: o population growth and shift; o land redistribution and development; o land ownership; o industries; o indigenous knowledge. • Organisations in the farming industry: roles and examples. • Agricultural legislation: water, soil conservation.
Soil science	• Basic and components: ▪ components; ▪ rock minerals (primary and secondary). • Soil forming factors and process: ▪ geographical factors; ▪ climate; ▪ biological factors; ▪ weathering of rocks.
Animal sciences	• General classification, importance and economic value of animals: ▪ beef; ▪ dairy; ▪ sheep; ▪ pigs; ▪ goats; ▪ horses; ▪ chickens.
Plant sciences	• General classification, importance and economic value of plants: ▪ field crops; ▪ horticultural crops; ▪ fodder crops; ▪ forests (wood production).
Optimum resource utilisation	• Agricultural resources: ▪ soil and water control and conservation; ▪ water quality; ▪ agricultural pollution; ▪ soil degradation.
Biological concepts	• An overview of the cell and its components and properties. • The cell division process and why it is necessary.

Grade 11

KNOWLEDGE AREA	CONTENT
Basic chemistry	• Compounds: ▪ overview of the general atomic structures of the compounds most important to agriculture; ▪ formation of simple and organic compounds.
Soil science	• Profile and characteristics: ▪ physical and morphological characteristics (e.g. texture, structure, colour, air, temperature, moisture, soil pores); • Chemical and colloidal properties: ▪ inorganic and organic; ▪ adsorption and exchange; ▪ acidity, alkalinity and salinity (danger and reclamation); ▪ organic matter and its importance. • Soil microbiology: importance and role in agriculture. • Soil classification: necessity and principles.
Plant science	• Plant nutrition: ▪ role of photosynthesis; ▪ absorption and storage of water and nutrients. • Mineral nutrition: ▪ fertilisation practices; ▪ availability of nutrients and essential minerals; ▪ organic and inorganic fertilisers; ▪ nutritional elements and analysis. • Reproduction: ▪ plant improvement; ▪ methods of asexual and sexual reproduction; ▪ pollination. • Protection: ▪ weed control; ▪ plant pests and diseases and their control (inter-pest management control, IPM); ▪ insect control in seed and grass; ▪ the role of the state in protection.
Optimum resource utilisation	• Soil surveying and planning: aims and principles, leading to precision farming. • Water use: ▪ irrigation; ▪ scheduling of irrigation; ▪ drainage. • Soil cultivation: aims and methods (e.g. mulching, bare soil). • Crop rotation: the concept. • Controlled agricultural production: ▪ greenhouse; ▪ hydroponics; ▪ tunnels; ▪ aquaculture; ▪ other.

Grade 12

KNOWLEDGE AREA	CONTENT
Animal sciences	• Nutrition: ▪ alimentary canal and digestion; ▪ components and digestibility of feed; ▪ biological value of feed; ▪ energy value of feed; ▪ types of feed; ▪ supplements; ▪ planning a feeding programme (Pearson square, principles of a fodder flow programme). • Production: ▪ increasing production; ▪ shelter; ▪ handling of farm animals; ▪ behaviour of farm animals. • Reproduction: ▪ reproductive organs (male and female); ▪ parturition; ▪ artificial insemination (AI); ▪ embryo; ▪ milk production. • Protection and control: ▪ diseases (viral, fungal, metabolic, bacterial, protozoal); ▪ pests.
Agricultural management	• Marketing: ▪ price determination; ▪ the market; ▪ methods of marketing. • Entrepreneurship: business planning. • Production factors and management: ▪ soil; ▪ labour; ▪ capital; ▪ the management process.
Basic agricultural genetics	• Heredity, selection, variation and breeding: ▪ mechanisms; ▪ monohybridism and dihybridism; ▪ Mendel's law; ▪ segregation and independent recombination of characteristics. • Plants and animals. • Growth and genetic manipulation: genetically modified crops and their purpose.

ANNEXURE 2: WORK SCHEDULES FOR GRADES 10-12

Example of a Grade 10 Work Schedule

Duration in weeks	Context	Content	Learning Outcomes and Assessment Standards	Assessment	Resources
2	Agro-ecology: Ecological regions of the world. Ecological regions in SA.	Outline of various regions Geographical distribution and veld types	10.1.2 10.1.3	Research project Oral or written presentation Classwork Worksheet Mapwork Posters Reports Fieldwork Test Mind maps	Textbooks Field excursions Brochures Videos Maps
3	Agro-ecology: Adaptations to ecosystems	Adaptations of animals to specific regions Effect of weather phenomena	10.1.1 10.1.2 10.2.3 10.4.4		
3	Agro-ecology: Veld management	Foundation of livestock industry Principles of utilisation	10.1.2 10.2.2 10.2.4 10.2.5 10.4.4		
2	Agri-industry: Key importance Demand of foodstuffs	Provider of food, raw materials, jobs and economic stability Determined by natural resources	10.1.1 10.1.2 10.2.4 10.3.1 10.3.2 10.3.3 10.4.3 10.4.5	Discussions Research Debate Case study Presentation Tests Practical work	Textbooks Brochures Newspapers Videos
2	Agri-industry: Overview of agricultural development	Population growth Land ownership Industries Indigenous knowledge	10.1.1 10.1.2 10.3.2 10.3.3 10.4.1 10.4.3		

Duration in weeks	Context	Content	Learning Outcomes and Assessment Standards	Assessment	Resources
2	Agri-industry: Organisations in the farming industry Agricultural acts	Roles and examples Soil conservation	10.1.1 10.1.2 10.4.3 10.4.5		
5	Soil Science: Basic components	Components Rock minerals (primary and secondary)	10.1.2 10.2.1 10.4.1	Project Practical work Classwork Mind map Report Presentations Case Study Observations Tests Group assessment	Textbooks Soil samples Rock samples Brochures
3	Soil forming factors and process	Geographical factors Climate Biological factors Weathering of rocks			
5	Animal Studies: General classification, importance and economic value of animals	Beef, dairy, sheep, pigs, goals, horses, chickens	10.1.2 10.2.6 10.3.1 10.4.1 10.4.5	Projects Practical work Reports Discussion Presentations Tests Classwork Groupwork	Text books Farm visits Brochure Magazines
3	Plant studies: General classification, importance and economic value of plants.	Field crops Horticultural crops Fodder crops Forests (wood production)	10.1.1 10.1.2 10.1.3 10.2.2 10.3.1 10.3.2 10.3.3 10.4.3 10.4.5	Projects Practical work Reports Discussions Presentations Observations Tests Classwork Groupwork	Textbook Farm visits Food garden Brochure

Duration in weeks	Context	Content	Learning Outcomes and Assessment Standards	Assessment	Resources
3	Agricultural Resources	Soil and water control and conservation Water quality Agricultural pollution Soil degradation	10.1.2 10.2.6 10.3.1 10.3.2 10.3.3 10.4.1 10.4.4 10.4.5	Case Study Mind map Practical work Classwork Presentation Report Groupwork Peer assessment	Farm visits Textbooks Brochures Videos
2	Biological concepts	Overview of the cell and its components and properties Cell division process and why it is a necessary.	10.1.1 10.1.2 10.1.3	Microscope work Practical work Worksheets Drawings Tests Self assessment	Microscopes Slides Textbooks Video
5		**Revision and Examinations**			

Example of a Grade 11 Work Schedule

Duration in weeks	Context	Content	Learning Outcomes	Assessment	Resources
10	**SOIL SCIENCE**			Projects	Videos
	▪ Profile and characteristics	Physical and morphological characteristics	LO 1	Assignments	Resources
	▪ Soil microbiology	Inorganic & organic, adsorption and exchange, acidity,	LO 2	Presentation	Books
	▪ Chemical and colloidal properties	alkalinity and salinity (danger and reclamation)	LO 3	Homework	Charts
	▪ Soil classification	Organic matter and importance		and class work	Field
				Formal tests	excursions
9	**PLANT SCIENCE**			Informal tests	Brochures
	▪ Plant nutrition	Absorption and storage of water and nutrients	LO 1	Examinations	ARC –
	▪ Fertilization	Fertilisation practices	LO 2	Worksheets	leaflets
	▪ Propagation	Plant improvement	LO 3	Case studies	Multi media
	▪ Protection	Chemical weed control and plant diseases		Research	such as the internet
9	**OPTIMUM RESOURCE UTILIZATION**				
	▪ Soil surveying	Aim, principles, leading to precision farming	LO 1		
	▪ Planning	Irrigation/scheduling	LO 2		
	▪ Water use	Drainage	LO 3		
	▪ Soil cultivation	Aims and methods (Mulching, bare /minimum tillage, crop			
	▪ Crop rotation	rotation, monoculture etc)			
	▪ Controlled agric production	Ploughing, discing, harrowing etc.			
	▪ Veld management	Greenhouse, hydroponics, tunnels, aquaculture etc.			
	▪ Subsistence farming	Foundation of livestock industry and principles of utilization	LO 3		
		Drought, power, minimum tillage and food security	LO 4		
7	**AGRI MANAGEMENT**				
	▪ Production factors	Soil	LO 1		
		Labour	LO 2		
		Capital	LO 3		
		Management process			
5		**Revision and Examinations**			

Example of a Grade 12 Work Schedule

Duration in weeks	Context	Content	Learning Outcomes	Assessment	Resources
7	**ANIMAL SCIENCES**			Projects	Videos
	▪ Nutrition	Alimentary canal and digestion	LO 1	Assignments	Resources
		Components of feeds	LO 2	Presentation	Books
		Digestibility	LO 3	Homework	Charts
		Biological value, Energy value		Class work	Field
		Types of feed, Supplements		Formal tests	excursions
		Planning a feeding programme		Informal tests	Brochures
		Increase of production (shelters and behaviour)		Examinations	ARC –
				Worksheets	leaflets
4	▪ Reproduction	Reproductive organs (male and female)	LO 1	Case study	Multi media
		Parturition	LO 2	Research	such as the
		Milk production	LO 3		internet
10	**AGRI MANAGEMENT**				
	▪ Marketing	Price determination	LO 3		
		The market			
		Methods of marketing			
		Imports and exports			
	▪ Labour relations	Problems and challenges			
		Legislation	LO 4		
7	**ENTREPRENEURIAL SKILLS**	Entrepreneurship	LO 4		
		Business planning			
		Use of equipment			
		Sustainable use of resources			
2	**CONCEPTS OF SUSTAINABILITY**				
		Breeding and selection	LO 1		
		Breeding and selection	LO 2		
			LO 3		
3	**BASIC AGRICULTURAL GENETICS**				
	▪ Plants				
	▪ Animal				
	▪ Growth manipulation				
	▪ Genetic manipulation				
7		**Revision and Examinations**			