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REPUBLIC OF SOUTH AFRICA

NATIONAL CURRICULUM STATEMENT GRADES 10-12 (GENERAL)

LEARNING PROGRAMME GUIDELINES

AGRICULTURAL TECHNOLOGY

JANUARY 2008

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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 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

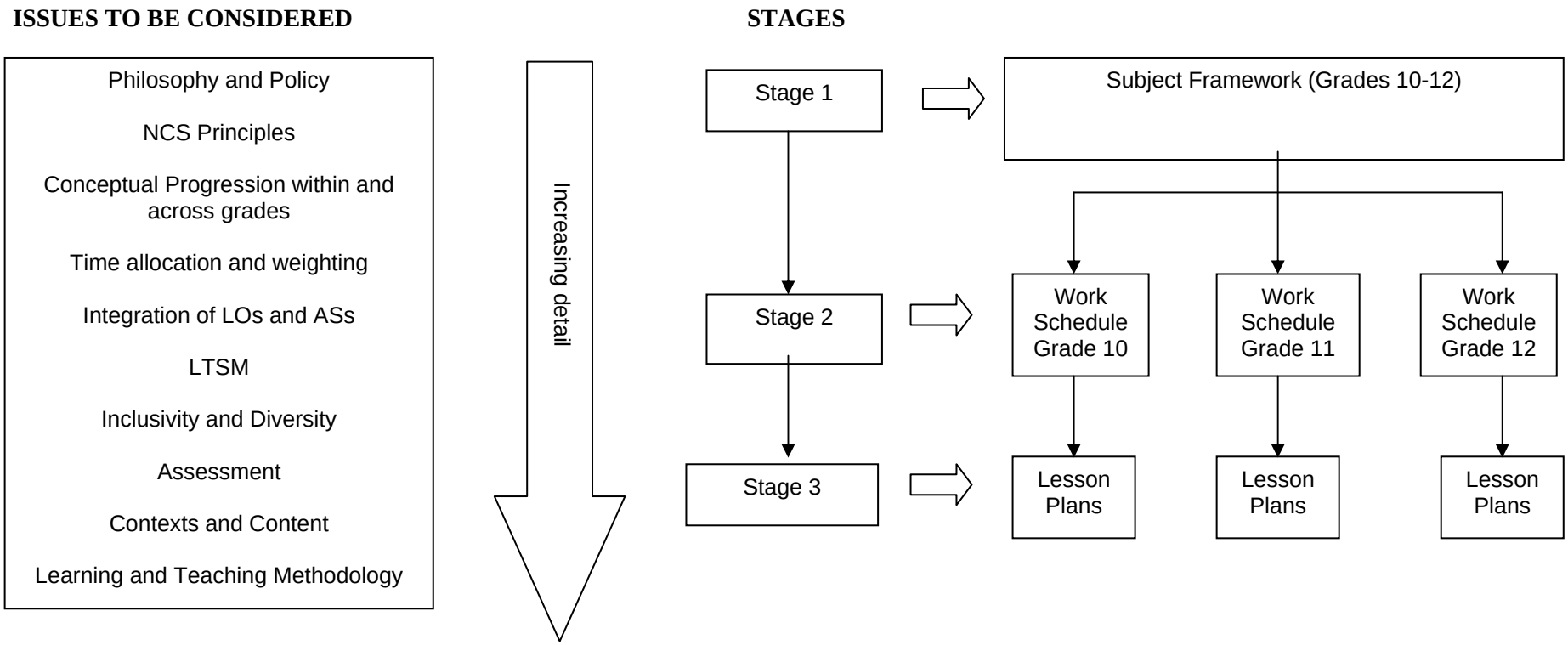
Designing Work Schedules

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 TECHNOLOGY

2.1 WHAT IS AGRICULTURAL TECHNOLOGY?

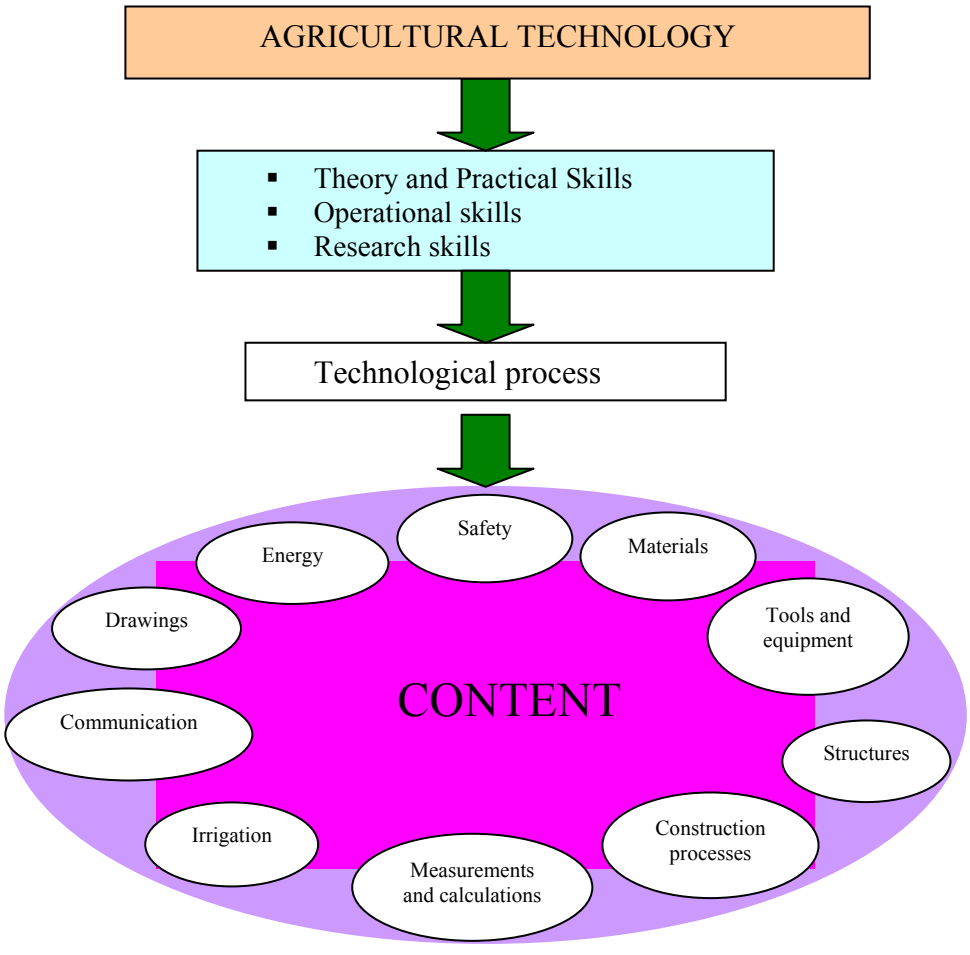
The subject Agricultural Technology focuses on technological processes used in agriculture. Agricultural Technology provides an understanding of how processes, equipment and structures are used with people, soil, plants, animals and their products. The environment, the sustenance and maintenance of the quality of life and increasing economic, aesthetic and sound cultural values are important considerations in Agricultural Technology.

The subject is of practical nature and is suitable to the agricultural environment. It will help learners to solve problems in an innovative and creative way. By applying the technological process, technology becomes knowledge in action.

This subject may only be offered in agricultural schools or schools with land and the required equipment.

Agricultural Technology draws on the following knowledge fields: technology, engineering, mathematics, physical and life sciences, geography and the agricultural field.

FIGURE 2: Theoretical components, skills and technological processes involved in Agricultural Technology



2.2 WHAT IS THE PURPOSE OF AGRICULTURAL TECHNOLOGY?

The subject Agricultural Technology exposes learners to skills, knowledge and values relevant within the agricultural and farming environment. It takes cognisance of and relates to the Critical and Developmental Outcomes, by preparing learners to:

- identify and solve problems in an Agricultural Technology environment using critical, innovative and creative thinking;
- apply practical skills in Agricultural Technology to enable learners to work effectively as a member of a team, group, organisation and/or community;
- organise and manage themselves and activities responsibly and effectively;
- collect, analyse, organise, critically evaluate and present information;
- communicate effectively using verbal, written, visual, and graphical communication as well as mathematical skills;
- use science and technology effectively and critically, showing responsibility and accountability towards the sustainable use of the environment, the rights and health of others in line with Agricultural Education and Training (AET) goals; and
- show an understanding of the indigenous knowledge, ethical considerations and values which relate to Agricultural Technology, therefore improving the image of agriculture as career and livelihood choice.

Learners will be prepared for various career pathways and additional education and training opportunities by:

- reflecting on Agricultural Technology and exploring a variety of strategies;
- participating as responsible citizens locally and internationally;
- applying knowledge and skills of agricultural technology in various farming related contexts by being culturally sensitive;
- exploring education and career opportunities; and
- developing entrepreneurial skills.

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

Agricultural Technology endorses the key principles of the National Curriculum Statement Grades 10-12 (General) in the following ways:

2.3.1 Social transformation

Agricultural Technology 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 Technology aims to expose learners to agriculture as a career and livelihood choice.

2.3.2 Outcomes-Based Education

Agricultural Technology encourages a learner-centred approach and is based on real-life activities related to farming such as ploughing and fencing.

2.3.3 High knowledge and high skills

Agricultural Technology provides the possibility for learners to be empowered with a high level of knowledge and skills to become innovative and capable of solving problems in an agricultural environment, e.g. the choice of the relevant irrigation method, its parts and its maintenance.

2.3.4 Integration and applied competence

Agricultural Technology integrates all Learning Outcomes and Assessment Standards within and across the subject. It also integrates with other fields of learning to achieve practical, foundational and reflective competences, e.g. Languages as needed in communication; Mathematics needed for calculation and calibration of irrigational systems; Physical Sciences as foundational theories e.g. electricity; Consumer Studies applicable in costing; contouring, soil, water and weather of Geography applicable in irrigation, ploughing and structures; Agricultural Management Practices and Agricultural Sciences which is supported by the technical content and skills of Agricultural Technology.

2.3.5 Progression

The content and context of Agricultural Technology have different expected performance levels per grade that indicate progression from one grade to another. For example, knowledge and identification of engine and driving system parts in grade 10; functioning of engine and driving systems in grade 11; and fault finding and problem solving of engine and driving systems in grade 12.

2.3.6 Articulation and portability

The subject promotes access for learners to Higher Education qualifications and portability of skills applicable to the world of work.

2.3.7 Human rights, inclusivity and environmental and social justice

Agricultural Technology is sensitive to human rights issues. This subject instils in learners a sense of respect for the environment. It also promotes social justice.

2.3.8 Valuing Indigenous Knowledge Systems (IKS)

Agricultural Technology is designed in such a way that it values IKS, developed and used through the years by communities to solve local problems in their agricultural environment, e.g. burning of dung between cattle during the night as mosquito repellent; fires between orange trees to prevent black frost damage.

2.3.9 Credibility, quality and efficiency

Agricultural Technology, as offered in agricultural schools in South Africa was developed in consultation with local specialists, encapsulates the essence of progressive thinking and is adapted to South African conditions.

2.4 PROFILE OF AN AGRICULTURAL TECHNOLOGY LEARNER

A learner who wishes to pursue a study in technology, its processes and use, as applied in the agricultural environment is encouraged to take Agricultural Technology. Depending on the local circumstances, some learners may have a relatively advanced knowledge of content and communication skills within agriculture.

All four Learning Outcomes of Agricultural Technology have strong links with NCS Learning Areas in Grades R-9 as illustrated in Table 2.1 below.

TABLE 2.1: COMPARISONS BETWEEN NCS GRADES R-9 AND NCS GRADES 10-12

NCS Learning Areas in Grades R-9	NCS Grades R-9: Learning Outcomes	NCS Grades 10-12: Learning Outcomes
Technology	1, 2 and 3	1, 2, 3 and 4
Economic and Management Sciences	3	2, 3 and 4
Mathematics	4 and 5	2, 3 and 4
Languages	1, 2, 3, 4, 5 and 6	1, 2, 3 and 4
Life Orientation	1, 2, 3, 4 and 5	1
Natural Sciences	1, 2 and 3	1, 2, 3 and 4
Arts and Culture	1 and 4	1 2 and 3
Social Studies		1

The learner, who chooses this subject, will do so for a variety of reasons, namely to:

- pursue a career in the agricultural environment; and
- acquire applied, transferable and entrepreneurial skills.

The learner in Agricultural Technology should demonstrate the following qualities and skills to excel in the subject:

TABLE 2.2: SKILLS AND APPLIED EXAMPLES

Skills and Qualities	Possible examples of application in Agricultural Technology
Operational skills	▪ maintenance and construction of fences and structures in an agricultural environment ▪ handling of hand tools ▪ maintain and operate mechanized equipment applicable to agriculture ▪ applying safety measures in all of the above ▪ communication skills in the interpretation of diagrams and drawings and report writing ▪ measurements and cost calculations of specific projects.
Research skills	▪ apply scientific related skills ▪ innovative and creative skills.
Technological skills	▪ problem-solving skills ▪ logical and practical thinking skills ▪ organising of technological processes ▪ welding.
Willingness to learn and apply skills in the agricultural environment. **Willingness to engage in life long learning in a technologically changing environment.**	

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

The table below illustrates the relationship between the Agricultural Technology Learning Outcomes and the Critical and Developmental Outcomes, and possible application in developing Agricultural Technology skills, knowledge and values:

TABLE 2.3: RELATIONSHIP BETWEEN AGRICULTURAL TECHNOLOGY LEARNING OUTCOMES AND THE CRITICAL AND DEVELOPMENTAL OUTCOMES, AND EXAMPLES OF APPLICATION IN AGRICULTURAL TECHNOLOGY

Critical and Developmental Outcomes	Examples of Application in Agricultural Technology	Agricultural Technology LOs
Identify and solve problems and make decisions using critical and creative thinking.	Evaluate and use different types of steel e.g. materials for construction of animal handling facilities.	1, 2, 3 and 4
Work effectively with others as members of a team, group or organisation and community.	Learners need people skills to work effectively as part of a farm management team and must be able to communicate, e.g. with suppliers of agricultural products.	1, 2, 3 and 4
Organise and manage themselves and their activities responsibly and effectively.	Agricultural Technology learners should be self-disciplined, able to plan, organise and manage their work, keep to time schedules; be committed to the task and take responsibility for their actions; be able to work under pressure in an agricultural environment, e.g. plant and harvest season.	1, 2, 3 and 4
Collect, analyse, organise and critically evaluate information.	Learners should be able to observe and record data in a variety of ways, e.g. irrigation design and scheduling.	1, 2, 3 and 4
Communicate effectively using visual, symbolic and/or language skills in various modes.	Learners need to be able to communicate through verbal, non-verbal and symbolic language, e.g. to interpret diagrams of irrigation pumps or electric fencing.	1, 2, 3 and 4
Use science and technology effectively and critically **showing responsibility** towards the environment and the health of others.	The effective use and maintenance of equipment, e.g. smoking diesel engine.	1, 2, 3 and 4
Demonstrate an understanding of the world as a set of related systems by recognising that **problem solving contexts do not exist in isolation.**	To solve problems quickly and effectively, e.g. scheduling of the irrigation to prevent over irrigation and the exploitation of natural resources.	1, 2, 3 and 4
Reflect and explore a variety of strategies to learn more effectively.	Agricultural Technology combines theory with practice, e.g. planning, drawing, costing and constructing of a fence.	1, 2, 3 and 4
Participate as **responsible citizens** in the life of local, national and global communities.	Optimum resource management, e.g. soil, veld and water utilization.	1, 2, 3 and 4
Be **culturally and aesthetically sensitive** across a range of social contexts.	Consider religious concerns, e.g. Jewish and Muslim followers not to handle pigs.	1, 3 and 4
Explore education and career opportunities.	The Agricultural Technology field offers a varied range of professional and vocational opportunities, e.g. agricultural technicians and mechanics.	1, 3 and 4
Develop **entrepreneurial** opportunities.	The Agricultural Technology field offers a varied range of professional and vocational opportunities for the entrepreneur, e.g. to start own irrigation business or repair of farm equipment for farmers.	1, 2, 3 and 4

2.6 WAYS TO ACHIEVE AGRICULTURAL TECHNOLOGY LEARNING OUTCOMES

Approach to Agricultural Technology
The NCS encourages active learning, problem solving, lateral thinking, critical reflection, decision-making, and working co-operatively, in groups or independently. Agricultural Technology methodology promotes these skills.

Continuous Assessment allows learners and educators the opportunity to continually reflect on the development and progression of skills, knowledge and values over a period of time, through a grade and through grades 10 to 12.

Characteristic of Agricultural Technology
Agricultural Technology is characterised by the application of the technological processes and practical skills in everyday agricultural activities. This subject is offered in schools with required equipment and land or access to land.

Resource material
Agricultural Technology is of a practical nature and requires applying processes, using equipment and materials to build structures for agricultural needs.

The approach to teaching and learning in Agricultural Technology provides scope for the use of a variety of resources:

- textbooks are essential but should not be considered as the only source of Agricultural Technology content;
- other relevant resources such as catalogues, user manuals, magazines, journal articles, radio and television, local experts, electronic media and internet sites are also informative and useful; and
- models, parts of engines and pumps, tools and equipment used, etc.

Learners must be encouraged to use their own initiative and not only follow the textbooks. Project-based learning, collaborative learning and group work need to be encouraged. Content needs to be selected in such way that it encourages the development of creativity, critical thinking, research skills, reading proficiency and interpretation skills.

All Learning Outcomes to be achieved by each learner
The Learning Outcomes for Agricultural Technology are the same for all grades. Each learner has to achieve every Learning Outcome in order to proceed to the next grade. Each Learning Outcome has its Assessment Standards, which give more detail with regard to content and context, and application of such content. The Assessment Standards describe ways of achieving the Learning Outcomes. They have been crafted in such a way that there is a natural progression in the development of skills, processes, concepts, content knowledge and values within as well as across grades.

Each grade builds on the competencies developed in the previous grade, e.g. faultfinding on system parts in motorized equipment in Grade 12 is built on the knowledge of systems in Grade 11, which in turn builds on the knowledge of parts in Grade 10.

Interrelationship of Learning Outcomes
The four Learning Outcomes are integrated and not presented in any specific order. They should not be considered sequential as each one supports and underpins each other.

According to Bloom's taxonomy model the learner should benefit from development of knowledge and intellect (cognitive domain); attitude and beliefs (affective domain); and the ability to put physical and bodily skills into effect – to act (psychomotor domain).

This approach supports and expands learners' opportunities to acquire knowledge, attain skills, and develop values across the curriculum e.g. knowledge of materials, structures and tools and equipment (LO 3) applied in the construction of animal shelters (LO 4) using the technological process (LO 2) considering the environment and its society (LO 1).

Content within Context

The Learning Outcomes are formulated in a manner that specifies the broad context in which content has to be dealt with. The same content can be used in different contexts. The context words from Bloom's Taxonomy have a specific explanation which will determine how the content will be presented and assessed, e.g. labelling of farm motorized equipment or describing the operation of a system and applying this content knowledge on fault finding by using the technological process.

In assessment these context words are important, because if learners fail to present content in the desired (specified) context the outcomes are not achieved. The teaching and learning activities should therefore provide learners with opportunities to acquire the intellectual skill to respond meaningfully and thereby demonstrate achievement of the outcomes. The following table lists context words and an explanation as well as related verbs to be used.

TABLE 2.4: CONTEXT WORDS FROM BLOOM'S TAXONOMY

CONTEXT WORDS	EXPLANATION AND RELATED VERBS
Knowledge	Memorize and recall information: ▪ arrange, define, label, list, outline and order.
Comprehend (understand)	Interpret information in one's own words: ▪ describe, indicate, restate, review, summarize and classify.
Application	Apply knowledge to situations: ▪ apply, calculate, draw, explain, identify, illustrate, prepare, operate, practice, solve, sketch and use.
Analysis	Breakdown knowledge into parts and show relationship among parts: ▪ analysis, categorize, compare, distinguish, discuss, examine, investigate and test.
Synthesis	Bring together parts of knowledge to form a whole; build relationships for new situations: ▪ arrange, compose, formulate, organise, plan, assemble and construct.
Evaluations	Make judgments on basis of criteria: ▪ appraise, assess, comment on, critically analyse, evaluate, conclude, interrogate, judge, predict, compare and score.

The context verbs indicate progression within a grade and across Grades 10-12, by increasing the depth of difficulty with which skills, knowledge and values are dealt in this particular grade.

The following taxonomy was designed by Bloom to indicate level of difficulty:

TABLE 2.5: BLOOM'S TAXONOMY

Level		COGNITIVE Knowledge	AFFECTIVE Attitude	PSYCHOMOTOR Skills
1	Low Level	Recall data	Receive (awareness)	Imitation (copy)
2		Understand	Respond (react)	Manipulation (follow instructions)
3	Medium Level	Apply (use)	Value (understand/act)	Develop precision
4		Analyse (structure, elements)	Organise personal value system	Articulation (combine, integrate related skills)
5	High Level	Synthesize (create, build)	Internalise value system (adopt behaviour)	Naturalization (become expert)
6		Evaluate (assess, judge in relational terms)		

Achieving Agricultural Technology Learning Outcomes by using the related Assessment Standards

Learning Outcomes 1 and 2 will be integrated during the learning, teaching and assessment of Learning Outcomes 3 and 4.

The knowledge content as stated in Learning Outcome 3 and its application in Learning Outcome 4 can be achieved by using the Assessment Standards, which are all documented in the NCS Subject Statement for Agricultural Technology.

See Annexure 1 for the content framework for Agricultural Technology.

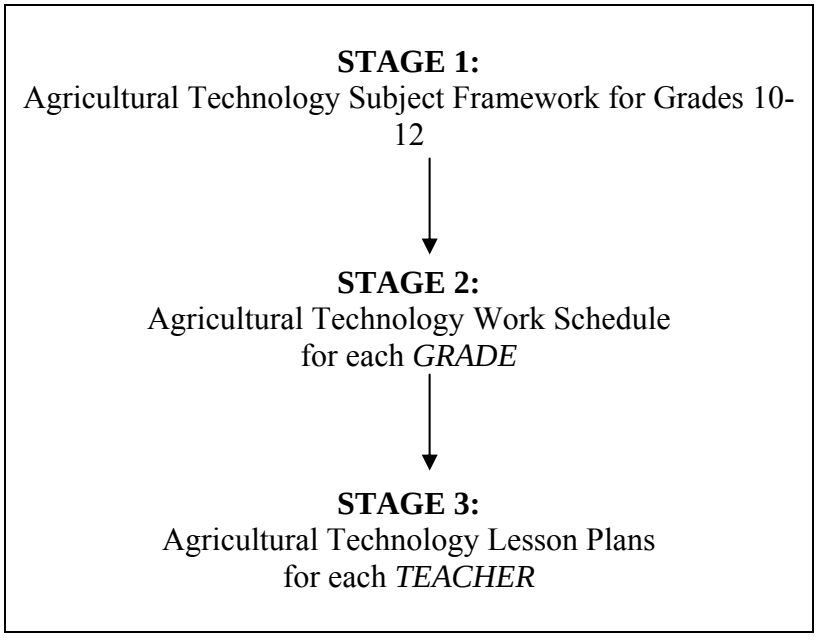
SECTION 3

DESIGNING A LEARNING PROGRAMME FOR AGRICULTURAL TECHNOLOGY

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 Technology are achieved in a progressive manner. It is recommended that the Agricultural Technology 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 Technology 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 Technology in that particular grade (see Section 3.3.2). Finally, the individual Agricultural Technology 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 Technology 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 Technology 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 Technology supports the application of the nine principles of the NCS • Critical and Developmental Outcomes: Refer to Section 2.5 to see how Agricultural Technology 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 Technology • 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 Technology

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 Technology 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 Technology 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 Technology 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 Technology 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 Technology. 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 Technology 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 Technology 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 Technology 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 Technology

Planning for the teaching of Agricultural Technology 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 Technology

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 Technology

Each grade-specific Work Schedule for AGRICULTURAL TECHNOLOGY 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 Technology.

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. See Annexure 3 for an example of Lesson Plans.

3.3.4 Reflection and review of the Agricultural Technology 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 Technology 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 TECHNOLOGY:

	Subject Framework for Agricultural Technology (Grades 10-12)	Work Schedule for Agricultural Technology (per grade)	Lesson Plans for Agricultural Technology
Step 1	**Clarify the Learning Outcomes and Assessment Standards.** The essential question for Agricultural Technology 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 Technology Subject Statement.	**Package the content.** Study the Learning Outcomes and Assessment Standards prescribed for the particular grade in Agricultural Technology 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 Technology 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 Technology. Besides the conceptual progression in the Assessment Standards for Agricultural Technology, context can also be used to sequence groupings in Agricultural Technology.	**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 Technology (Grades 10-12)	Work Schedule for Agricultural Technology (per grade)	Lesson Plans for Agricultural Technology
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 Technology 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 TECHNOLOGY

The following tables provide an indication of the content that should be addressed per Assessment Standard in Learning Outcome 3 in each of Grades 10, 11 and 12. The skills highlighted in Learning Outcomes 1, 2 and 4 should be presented in combination with the content suggested for Learning Outcome 3.

Grade 10		
Assessment Standards		**LO 3: Content**
10.3.1	Demonstrate awareness and knowledge of working safely in the agricultural environment according to the OHS Act.	**Safety** ▪ OHS Act: Reference to relevant workshop practices. ▪ General Safety Regulations: • Safe handling of tools. • Safe use of static or stationary farm equipment. • Fire fighting equipment for the prevention and control of electrical fires. • Electrical safety: Electrocution & fire hazard. • Safe use and storage of hazardous substances.
10.3.2	Know and understand the principles, concepts and properties of different materials and their uses in making types of agricultural structures.	**Materials and Structures:** ▪ Materials to be considered**:** • Metals: - Ferrous: high carbon steel, mild steel, cast iron (grey & white). - Non-ferrous: aluminium, copper, zinc, lead and tin. - Alloys: brass, soldering and stainless steel. • Timber: - Softwood (treated poles and planks). • Building and construction: - Cement, sand and aggregate. - Stone, bricks and damp proof course. - Pre-cast items (beams, walls, poles, etc.). - Roof covering. • Fencing: - Types of wire. - Types of supports: (posts, struts, standards and droppers). ▪ Structure**:** • Building structures: Floors, walls and roof - Building mixtures: (Concrete, mortar and screed). - Basic foundations: (Compaction, vibration and reinforcing techniques). - Support: (Walls, beams, struts, columns and stands). - Roof: (Trusses (metal & wood) and roof covers). - Fencing: [Regulations regarding fencing and knowledge and use of different types of fencing: (cattle, small stock and mesh fences)].

10.3.3	Know and understand the application of the different basic skills and construction processes in the agricultural environment.	**Skills and Construction Processes:** ▪ Skills used in handling of related basic tools: • Measurements (different units). • Cutting, joining and bending. • Assembling. • Use of templates. ▪ Basic construction processes: • Basic carpentry: - Usage of timber in agriculture. • Metal work: - Basic Arc-welding: (simple joints and their symbols) - Types of rods and their uses. - Setting of welding current. - Different types of welding machines. - Basic Gas-welding: (simple joints and their symbols) - Types of welding wire. - Setting of gas bottles. - Setting of different flames. - Soft soldering: - Solder, flux and types of soldering irons.
10.3.4	Show an understanding of basic principles and economic use of electrical energy in agriculture.	**Electrical Energy** ▪ Basic principles of electrical energy: • Standard symbols and units as applicable to electricity and electrical appliances: AC, DC, watt, volt, ampère and ohm. • Electrical current, electrical potential and load. ▪ Economic use of electricity: • Elements of circuitry: lights, wiring and cables. • Heaters and refrigerators. • Motors (identification of single and three phase).
10.3.5	Identify the purpose and use of different basic tools, equipment and implements and knowledge of components of mechanised agricultural equipment and systems.	**Tools, Equipment, Implements and Mechanised systems** ▪ Basic tools, implements and equipment: • Hand tools used in workshop: electric and manual. • Horticulture cultivation tools and equipment: - Garden tools and equipment (spade, rake, hand spray, etc.). - Implements (rotavator, mower, etc.). ▪ Animal drawn and mechanized implements: • Basic cultivation: primary and secondary tillage implements. • Transportation. ▪ Mechanised systems: components • Engine systems: - 2-stroke, 4-stroke and diesel (ignition, cooling, lubrication, pulleys and belts.). • Driving systems: - PTO, steering and wheels. • Lift system: - 3-point coupling. • Braking systems: - Cable and hydraulic.

10.3.6	Know and identify the types and applications of different irrigation systems.	**Irrigation** ▪ Micro irrigation systems: • Hydroponics, micro sprayers and drip. ▪ Macro irrigation systems: • Flood and different types of sprinklers. • Pumps: - Stroke, centrifugal, submersible and rotor.
10.3.7	Know and identify the use and purpose of different sources of information and communication systems on a farm.	**Communication** ▪ Information sources: • Printed media (magazines/brochures). • Electronic media (TV/radio/internet). • Organised agricultural societies. • Farmer days and Agricultural shows. ▪ Different types of communication systems: • Two way radios, telephones and Internet.
10.3.8	Know and understand basic freehand sketching and drawings related to agriculture.	**Drawings** ▪ Interpret and use: • Basic freehand sketches and drawings: - Lines (hidden, dash and dotted). - Views and symbols.
10.3.9	Know and understand the concepts and principles of measurements and calculations used for maintenance expenditure and the calibration of tools and equipment as applied in the agricultural environment.	**Measurements, Calculations and Calibrations** ▪ Different measurements and related units. ▪ Basic expenditure calculations in projects. ▪ Calibration of tools and equipment used.

Grade 11		
Assessment Standards		**LO 3: Content**
11.3.1	Demonstrate awareness and knowledge of working safely in the agricultural environment according to the OHS Act.	**Safety** ▪ OHS Act: Application to relevant workshop practices. ▪ General safety regulations: • Safe handling of advanced tools. • Safety regarding electricity. • Safe use of mechanized farm equipment. • Fire fighting equipment for the prevention and control of veld fires. • Safe use and storage of hazardous substances. ▪ Knowledge of the code of practice for livestock, poultry and pigs.
11.3.2	Know and understand the principles, advanced concepts, properties of different materials and their uses in making agricultural structures.	**Materials and Structures:** ▪ Materials to be considered**:** • Metals: - Ferrous: high carbon steel, mild steel, cast iron (grey & white). - Non-ferrous: aluminium, copper, zinc, lead and tin. - Alloys: brass, soldering and stainless steel. • Timber: - Softwood (treated poles and planks). • Polymers: - Fibreglass & resins; PVC and adhesives. • Plumbing: - Water pipes: galvanised, copper and polymers. - Other accessories. • Fencing: - Types of wire. - Supports: posts, struts, standards and droppers. ▪ Structures • Buildings: - Plan and maintain structures for animal production (handling facilities and/or housing) considering: Design and construction concepts. Elements of nature and soil factors. Waste management (drainage and solid waste). Basic plumbing (water pipes, gutters, drain pipes and accessories). • Fencing: - Related regulations. - Knowledge and use of different types of complex fences: (Game fences and security fences).
11.3.3	Know and understand the application of the different advanced skills and construction processes in the agricultural environment.	**Skills and Construction Processes:** ▪ Skills used in handling of related advanced tools: • Measurements (venier). • Cutting, joining and bending. • Assembling. • Use of templates. ▪ Construction processes: • Carpentry: - Timber in agricultural environment. • Metal work: - Basic sheet metal work. - Heat treatment: tempering, annealing and case hardening. - Arc-welding: Complex joints (pipes, etc.) and their symbols. Types of rods and their uses.

		Setting of welding current. Different types of welding machines. - Gas-welding: complex joints (pipes, etc.) and their symbols Complex joints (pipes, etc.) and their symbols. Types of welding wire. Setting of gas bottles. Setting of different flames. - Hard soldering: Braze and silver soldering.
11.3.4	Know and understand equipment generating and distributing electrical energy in agriculture.	**Electrical Energy** ▪ Utility equipment generating electrical energy: • Symbols/units as applicable (AC, DC, kW, etc.) • Generator and alternator ▪ Utility equipment distributing electrical energy: • Transformer. • Elements of circuitry: - Distribution boards. - Lights, plugs and switches. - Wires and cables. - Overall protection: trip switches, earthing and load protection (concept and method).
11.3.5	Know and understand the purpose and effective use of advanced tools, equipment, implements and components of mechanised agricultural equipment and systems.	**Tools, equipment, mechanised implements and systems** ▪ Advanced tools and equipment: workshop and outdoor. • Animal handling. • Scales and weighing equipment. ▪ Mechanical crop cultivating implements and equipment: • Ploughs, planters, tillers, etc. • Spraying equipment. ▪ Electric motor: star and delta motors (single and three phase) • Types of electric motors and their different components. ▪ Mechanised systems: • Engine systems: - 2-stroke, 4-stroke and diesel (ignition, cooling, lubrication, and hydraulic). • Driving systems: - PTO, steering and wheels (bearings). • Lift system: - 3-point coupling. • Braking systems: - Cable, hydraulic and pneumatic.
11.3.6	Describe and demonstrate an understanding of technical principles of the systems in irrigation, wastewater, water supply and the different drainage systems in an agricultural environment.	**Irrigation and Water Management** ▪ Irrigation systems. ▪ Pumps. ▪ Water supply systems: • Tanks, dams and reservoirs. • Weirs, canals and sluice gate. • Boreholes and wells. ▪ Drainage systems: • Stone, pipes and open drains. ▪ Waste water: • Contours and erosion control.

11.3.7	Know and understand the effective use of communication technology in agriculture.	**Communication** ▪ Computer technology in agriculture: • Feeding. • Temperature control.
11.3.8	Interpret and produce freehand sketches of orthographic and isometric drawings related to agriculture.	**Drawings related to agriculture** ▪ Drawings used in agriculture: • Different views: - Front, side and top.
11.3.9	Interpret the concepts and principles of measurement and calculation used for maintenance expenditure and the calibration of tools and equipment in the agricultural environment	**Measurements, Calculations and Calibrations** ▪ Measurement and calibration as applicable in tools, implements and equipment used in: • Cultivation. • Delivery pressure, flow and temperature. • Symbols. ▪ Calculation of fabrication and maintenance expenditure: • Production, running and machinery cost.

Grade 12		
Assessment Standards		**LO 3: Content**
12.3.1	Demonstrate awareness and knowledge of working safely in the agricultural environment according to the OHS Act.	**Safety** ▪ OHS Act: Reference to relevant workshop practices. ▪ General safety regulations: • Safe handling of more advanced tools (hydraulic and pneumatic). • Safety regarding electricity. • Road safety and roadworthiness. • Safe use of motorized farm equipment. • Fire fighting equipment for the prevention and control of fires of hazardous substances. • Safe use and storage of hazardous substances.
12.3.2	Know and understand the principles, more advanced concepts, properties of different materials and their uses in making different types of agricultural structures.	**Materials and Structures** ▪ Materials, their protection and maintenance: • Metals: - Galvanise, plating, undercoat and painting. - Elements of nature. • Timber: - Treatment, painting and creosote. • Materials for special use: - Polymers: Polystyrene, PU-foam, Teflon and epoxy. - Ventilation (cooling and heating): - Insulation. • Materials used for electric fencing. ▪ Structures: • Building: - Planning and maintaining of structures for plant production (e.g. tunnels), curing and storage facilities: Design, construction and production concepts. Elements of nature and soil factors. Ventilation and insulation. • Fencing: - Electrical fencing components: Energizers, energy sources and care (insulators, etc.). Supports, wires, posts, standards and droppers. Maintenance.
12.3.3	Know and understand the application of more advanced skills and construction processes in the agricultural environment.	**Skills and Construction Processes:** ▪ Skills used in handling of related more advanced tools: • Measurements. • Cutting, joining and bending. • Assembling. • Use of templates. • Finishing off. ▪ Construction processes: • Additional carpentry: Doors, door- and window frames: - Fitting of hinges, locks and glass (glazing). • Metal work: - Sheet metal work. - Arc-welding: more advanced joints and their applications. - Gas-welding: more advanced joints and their applications. - CO_2-welding: Components & setting of welding equipment.

12.3.4	Know, understand and explain the use of alternative sources that generate electrical energy in agriculture.	**Electrical Energy** ▪ Alternative sources of electrical energy: • Solar systems, wind generator, hydro-electricity, geothermal, bio-energy (methane amongst others). • Batteries.
12.3.5	Know and understand the purpose and effective use of more advanced tools, equipment, implements and components of mechanised agricultural equipment and systems.	**Tools, equipment, mechanised implements and systems** ▪ More advanced tools and equipment: • Pneumatic and hydraulic tools. • Specialized cultivation tools and equipment. ▪ More advanced implements: • Harvesting implements for plant and animal products: - Harvesters, silage cutter, balers, etc. - Milking, shearing, sorting, etc. ▪ Electric motors: fault finding, problem solving, maintenance and care. • Star and delta motor (single and three phase). ▪ Mechanised systems: Diagnose faults, problem solving, maintenance and care: • Engine systems: 2-stroke, 4-stroke and diesel - ignition, cooling, lubrication and hydraulic, differentials, gears, chains. • Driving systems: - PTO, steering and wheels (bearings). • Lift system: - 3-point coupling. • Braking systems: - Pneumatic and hydraulic.
12.3.6	Know and understand the effective use and purpose of the irrigation systems, water supply and drainage systems in an agricultural environment.	**Irrigation and water management** ▪ Irrigation systems: fault finding, problem solving, maintenance and care: • Pumps. • Water supply. • Scheduling and operating. • Drainage systems. • Waste water management.
12.3.7	Know and understand the effective use of communication technology in agriculture.	**Communication** ▪ Computer technology information: • Irrigation scheduling. • Temperature control.
12.3.8	Interpret and produce freehand sketches of assembly and sectional drawings related to agriculture.	**Drawings** ▪ Drawings used in agriculture: • Sectioned views. • 1st and 3rd angle and isometric views.
12.3.9	Apply the concepts and principles of measurement and calculation used for maintenance expenditure and the calibration of tools and equipment in the agricultural environment.	**Measurements, Calculations and Calibrations** ▪ Problem solving in application of data collected from measurements and calculations. ▪ Use data collected from measurements and cost calculations in purpose made fabrications. ▪ Effective use of tools, equipment and implements due to correct measurements, calibrations and adjustments.

ANNEXURE 2: WORK SCHEDULES FOR GRADES 10-12

Note:

- Assessment Standards and content is integrated, aligned and sequenced per topic and then paced for a school year.
- Topic can include combined Assessment Standards.
- Sequence is determined by progression in difficulty of topics in the year, e.g. Communication is placed first, to give an orientation to the subject, applicable outside organisations and information sources needed in this subject.
- Sequence is determined by synchronisation of school organisation, classroom and workshop timetables, planting season, other subjects e.g. Agricultural Management Practices for cross support and agricultural events.

Example of a Grade 10 Work Schedule

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 1						
1 week 4 hours	**Communication** ▪ Sources of different agricultural information ▪ Communication systems used on a farm	▪ Information sources: • Printed media (magazines/brochures), diagrams. • Electronic media (TV/radio/internet). • Organised agricultural societies, farmer days and agricultural shows. ▪ Different types of communication systems: • Two way radios, telephones and Internet.	 LO 3 & 4 LO 1 LO2 LO 3 & 4	 10.3.7 10.1.1 10.2.1 10.2.5	Class work Homework Worksheets Assignments Projects Case studies Informal test	Books Magazines Charts Photos Field charts Brochures Guidelines ARC-leaflets Multi media such as internet Electronic media - DVD, CD Models Videos Farming equipment Animals Plant facilities Agricultural experts Excursions
2 weeks 8 hours	**Safety** ▪ OHS Act: introduction ▪ General safety and hazardous substances ▪ First Aid ▪ HIV/Aids awareness	▪ OHS Act: Reference to relevant workshop practices. ▪ General Safety Regulations: • Safe handling of tools. • Safe use of static or stationary farm equipment. • Fire fighting equipment for the prevention and control of electrical fires. • Electrical safety: Electrocution & fire hazard. • Safe use and storage of hazardous substances. ▪ First Aid: • Basic First Aid techniques and the use of basic equipment. ▪ HIV/Aids related awareness.	LO 3 & 4 LO2 LO 1	10.3.1 10.2.1 10.1.3	Class work Homework Worksheets Assignments Projects Case studies Informal test	

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
2 weeks 8 hours	**Energy** ▪ Basic principles of electric energy ▪ Economical use	▪ Basic principles of electrical energy: • Standard symbols and units as applicable to electricity and electrical appliances: AC, DC, watt, volt, ampère and ohm. • Electrical current, electrical potential and load. ▪ Economic use of electricity: • Elements of circuitry: lights, wiring and cables. • Heaters and refrigerators. • Motors (identification of single and three phase).	LO 3&4 LO 1 LO 3&4 LO 3&4	10.3.4 10.3.9 10.1.3 10.3.1 10.3.4	Class work Homework Worksheets Assignments Projects Case studies Informal test	Any applicable source from above list
6 weeks 24 hours	**Skills and Construction Processes** ▪ Drawings ▪ Tools	▪ Interpretation and use: • Basic freehand sketches and drawings: - Lines (hidden, dash and dotted). - Views and symbols. ▪ Skills used in handling of related basic tools: • Calibration of tools and equipment used. • Skills used in handling of related basic tools: - Measurements (different units). - Cutting, joining and bending. - Assembling. - Use of templates.	LO 3&4 LO2 LO 3&4 LO 2 LO 3&4 LO 3&4	10.3.8 10.2.5 10.3.9 10.2.1-5 10.3.9 10.3.3 10.3.9	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
	▪ Basic carpentry	▪ Basic carpentry: • Material: timber - Softwood (treated poles & planks). • Safety measures for woodwork tools. • Basic hand tools: electric and manual. • Usage of timber in agriculture.	LO 3&4 LO 1 LO 3&4 LO 3&4 LO 1- 4	10.3.2 10.1.1 10.3.1 10.3.4 All	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
	▪ Basic gas- and arc welding	▪ Materials to be considered: • Metals: • Materials: - Ferrous: high carbon steel, mild steel, cast iron (grey & white). - Non-ferrous: aluminium, copper, zinc, lead and tin. - Alloys: brass, soldering and stainless steel. • Metal work: • Basic Arc-welding: (simple joints and their symbols) - Types of rods and their uses. - Setting of welding current. - Different types of welding machines. • Basic Gas-welding: (simple joints and their symbols) - Types of welding wire. - Setting of gas bottles. - Setting of different flames. • Soft soldering: - Solder, flux and types of soldering irons.	LO 3&4 LO 3&4 LO 2 LO 1 LO 3&4 LO 1 LO 3&4 LO 3&4 LO 2	10.3.2 10.3.2 10.1.3 10.3.1 10.3.3 10.2.1-5 10.2.1-5 10.1.3 10.3.1 10.3.9 10.3.3		
	▪ Term test	▪ All work			Formal test	

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 2						
9 weeks 36 hours	**Structures** ▪ Drawings ▪ Measurements ▪ Tools and equipment ▪ Cost and calculation ▪ Materials used in building and construction ▪ Structures: Foundations Support structures Roof structures ▪ Fencing	▪ Draw and interpretation drawings and sketches. ▪ Concepts and principles of measurements as needed. ▪ Handling of tools and equipment: • General Safety Regulations. ▪ Basic expenditure calculations: • Project cost. ▪ Building structures: • Materials used in building and construction - Cement, sand, aggregate, stone, bricks and DPC. - Timber: Soft wood (treated poles & planks). • Basic foundations - Compaction, vibration & reinforcing techniques. • Support structures - Walls, beams, struts, column and stands. • Roof - Thrusts (metal & wood) and roof covers. Fencing: • Regulations regarding fencing. • Knowledge and use of different types of fencing: - Cattle, small stock and mesh fences.	LO 3&4 LO 1 LO 3&4 LO 3&4 LO 1 LO 1-4 LO 1-4 LO 3	10.3.8 10.3.9 10.1.3 10.3.1 10.3.3 10.3.9 10 1.5 10.3.2 All 10.3 2	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
2 weeks	▪ Mid year examination	▪ All work			Examinations	

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 3						
10 weeks 40 hours	**Tools and Equipment** ▪ Manual tools and equipment used in agriculture ▪ Animal drawn implements	▪ Purpose and use of manual equipment and tools: • Calibration of tools and equipment. • Safety measures. ▪ Animal handling • Knowledge of the code of practice for livestock. • Safe use and storage of hazardous substances. ▪ Basic cultivation equipment: • Implements (rotavator, mower, etc.). • Garden tools and equipment (spade, rake, hand spray, etc.). ▪ Purpose and use of animal-drawn implements: • Safety measures. • Basic cultivation and transport equipment: - Primary tillage implements. - Secondary tillage.	LO 2 LO 3&4 LO 1 LO 3&4 LO 3&4 LO 3&4 LO 1 LO 3&4 LO 2 LO 1 LO 3&4	10.2.1-5 10.3.9 10.1.3 10.3.1 10.3.5 10.3.1 10.1.1 10.1.3 10.3.5 10.2.1-5 10.1.3 10.3.5	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
	Mechanised equipment ▪ Knowledge and identification of components ▪ Knowledge and identification of systems	▪ Knowledge and identification of parts: • The basic 2-stroke, 4-stroke and diesel engine systems: - ignition, cooling, lubrication, hydraulic, pulleys and belts. • The following systems: - Braking, PTO, steering, wheels.	LO3&4 LO 1	10.3.5 10.1.3	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
	▪ Term test	▪ All work			Formal Test	

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 4						
5 weeks 16 hours	**Irrigation** ▪ Types and uses of irrigation systems: • Micro • Macro	▪ Types and uses of micro irrigation systems: • Hydroponics, micro sprayers, drip. ▪ Macro irrigation systems: • Flood and different types of sprinklers. • Pumps: - Stroke, centrifugal, submersible and rotor. ▪ Interpretation and use of basic freehand drawings. ▪ Concepts and principles of measurements and calculations as needed.	LO 1 LO 3&4 LO 1 LO 3&4 LO 3&4	10.1.1, 2, 5 10.3.6 10.1.3 10.3.6 10.3.8	Class work Homework Worksheets Assignments Projects Case Study Informal test Practical work	Any applicable source from above list
1 week	**Revision**					
2 weeks	**Final Examination**	**All work completed during year**			Examination	

Example of a Grade 11 Work Schedule

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 1						Books Magazines Charts Photos Field charts Brochures Guidelines ARC-leaflets Multi media such as internet Electronic media - DVD, CD Models Videos Farming equipment Animals, Plant facilities Agricultural experts Excursions
1 week 4 hours	**Safety** ▪ OHS Act: Application ▪ General Safety Regulations ▪ HIV/Aids awareness	▪ OHS Act: Application to relevant workshop practices. ▪ General safety regulations: • Safe handling of advanced tools. • Safety regarding electricity. • Safe use of mechanized farm equipment. • Fire fighting equipment for the prevention and control of veld fires. • Safe use and storage of hazardous substances. ▪ Knowledge of the code of practice for livestock, poultry and pigs. ▪ HIV/Aids related awareness.	LO 3 & 4 LO 1	11.3.1 11.1.3	Class work Homework Worksheets Assignments Projects Case studies Informal test	
9 weeks 36 hours	**Skills and Construction Processes** ▪ Medical emergencies ▪ Drawings & sketches ▪ Advanced workshop tools	▪ How to deal with medical emergencies in the workshop and on the farm. ▪ Interpretation of drawings and sketching: • 1st & 3rd angle orthographic projection and isometric drawing: lines (hidden, dash and dotted). ▪ Handling of advanced workshop tools: • Safe handling of tools. ▪ Skills used in handling of related advanced tools: • Measurements (venier). • Cutting, joining and bending. • Assembling. • Use of templates.	LO 1 LO 3&4 LO 3&4, LO 2, LO 1 LO 3&4	11.1.3 11.3.8 11.3.9 11.2.1-5 11.1.2, 5 11.3.1 11.3.3 11.3.9 11.3.3	Class work Homework Worksheets Assignments Projects Informal test Practical work	
	Carpentry ▪ Carpentry as applicable to farming ▪ Treatment of wood and adhesives	▪ Materials: • Timber: Softwood (treated poles and planks). • Polymers: Fibreglass & resins, PVC and adhesives. ▪ Usage of wood in agricultural related needs • Joints and their application.	LO 3&4	11.3.2 11.3.3		

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
	Metal work ▪ Materials: heat treatment of metals ▪ Gas-welding and arc-welding ▪ Hard soldering ▪ Sheet metalwork	▪ Materials: Metals • Heat treatment: tempering, annealing, case hardening. • Gas-welding and Arc-welding: - Joints (pipes, etc.) and their application melt, lap, butt and T-joints. • Hard soldering: Braze and silver soldering. • Basic sheet metal work.	LO 3&4 LO 3&4 LO 1- 4 LO 3&4	11.3.2 11.3.3 All 11.3.3		
	▪ Term Test	All work completed in term			Formal Test	

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 2						
2 weeks 8 hours	**Energy** ▪ Safety ▪ Various utility equipment generating electrical energy ▪ Various utility equipment distributing electrical energy used in agriculture	▪ Safety regarding electricity. ▪ Utility equipment generating electrical energy: • Symbols/units as applicable (AC, DC, kW, etc.). • Generator and alternator. ▪ Utility equipment distributing electrical energy: • Transformer. • Elements of circuitry: - Distribution boards. - Lights, plugs and switches. - Wires and cables. - Overall protection: trip switches, earthing and load protection (concept and method).	LO 1, LO 3&4 LO 3&4 LO 3&4 LO 3&4	11.1.3 11.3.1 11.3.8 11.3.4 11.3.4	Class work Homework Worksheets Assignments Projects Informal test	Any applicable source from above list

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
7 weeks 28 hours	**Structures** ▪ Safety ▪ Drawings and sketches ▪ Cost calculation	 ▪ Safety measures ▪ Drawings used in agriculture: • Different views: • Front, side and top. ▪ Calculation of fabrication and maintenance costs: • Production, machinery, labour and marginal cost.	 LO 1 LO 3&4 LO 1 LO 3&4	 11.1.3 11.3.8 11.1.2, 5 11.3.9	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
	Building ▪ Construction and maintenance ▪ Plumbing	 ▪ Plan and maintain structures for animal production in regard to handling facilities and/or housing, considering: • Design, construction and production principles. • Elements of nature and soil factors. • Waste management: - Drainage and solid waste. ▪ Basic knowledge of principles, materials used in plumbing: • Water storage, gutters and drain pipes. • Water pipes: galvanised, copper, plastic, PVC and polymers. - Other accessories.	 LO 2 LO 1 LO 3&4 LO 1 LO 1 LO 3&4 LO1-4	 11.3.2 11.2.1-5 11.1.1, 3, 5 11.3.1, 2 11.1.8, 9 11.1.1 11.1.1 11.3.6 11.1.1,2,4 11.2.1-5 11.3.1, 2, 4-6, 8, 9		

Duration	Context	▪ Content	LOs	ASs	Suggested Assessment	Resources
	▪ Fences	• Fencing: - Related regulations. - Knowledge and use of different types of complex fences: (Game fences and security fences).	LO 1-4	11.1.1, 2, 4 11.2.1-5 11.3.1, 2, 4-8, 9		
2 weeks	▪ Mid year examination	▪ All work completed during the year			Examination	

Duration	Context	▪ Content	LOs	ASs	Suggested Assessment	Resources
Term 3						
10 weeks 40 hours	**Tools and Equipment** ▪ Safety regulations ▪ Specialized tools, implements and advanced agricultural equipment ▪ Calibration of tools and equipment as applied in the agricultural environment	▪ General Safety Regulations: • Safe handling of tools. • Safe use of static or stationary farm equipment. ▪ Advanced tools and equipment: workshop and outdoor. • Animal handling. • Scales and weighing equipment. ▪ Mechanical crop cultivating implements and equipment: • Ploughs, planters, tillers, etc. • Spraying equipment. ▪ Electric motor: star and delta motors (single and three phase) • Types of electric motors and their different components. ▪ Mechanised systems: • Engine systems: - 2-stroke, 4-stroke and diesel (ignition, cooling, lubrication, and hydraulic). • Driving systems: - PTO, steering and wheels (bearings). • Lift system: - 3-point coupling. • Braking systems: - Cable, hydraulic and pneumatic. ▪ Effective use in computer technology in agriculture: • Feeding, temperature control.	LO 1 LO 3&4 LO 3&4 LO 3&4 LO 2 LO 1 LO 3&4 LO 1 LO 2	11.1. 3 11.1.5 11.3.9 11.3.5 11.3.7 11.2.1,2 11.1.1,5 11.3.9 11.3.5 11.1.3 11.2.1,2	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
	Mechanised equipment ▪ Safety regulations ▪ Drawings ▪ Knowledge of functions of mechanised equipment, systems and components	▪ Safe use of mechanized farm equipment ▪ Drawings used in agriculture: • Different views: - Front, side and top. ▪ Electric motor: star and delta motors (single and three phase) • Types of electric motors and their different components. ▪ Mechanised systems: • Engine systems: - 2-stroke, 4-stroke and diesel (ignition, cooling, lubrication, and hydraulic). • Driving systems: - PTO, steering and wheels (bearings). • Lift system: - 3-point coupling. • Braking systems: - Cable, hydraulic and pneumatic.	LO 1 LO 3&4 LO 3&4 LO 3&4	11.1.3 11.3.8 11.3.5 11.3.5	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
	Control Test	All work completed in term			Formal Test	

Duration	Context	▪ Content	LOs	ASs	Suggested Assessment	Resources
Term 4						
6 weeks 24 hours	**Irrigation and water management** ▪ Principles of: irrigation systems, water supply, drainage systems, pumps ▪ Interpret drawings ▪ Measurement and calibration ▪ Cost calculation	▪ Irrigation systems. ▪ Pumps. ▪ Water supply systems: • Tanks, dams and reservoirs. • Weirs, canals and sluice gate. • Boreholes and wells. ▪ Drainage systems: • Stone, pipes and open drains. ▪ Waste water: • Contours and erosion control. ▪ Drawings needed in irrigation ▪ Interpret concepts and principles of measurement and calibration as applicable in equipment used • Delivery pressure, flow and temperature • Symbols ▪ Calculation of installation and running cost.	LO 3&4 LO 1 LO 3&4 LO 3&4	11.3.6 11.1.1,5 11.3.8 11.3.9	Class work Homework Worksheets Assignments Projects Informal test Practical work	Any applicable source from above list
2 weeks	**Final Examination**	**All work completed during year**			Examination	

Example of a Grade 12 Work Schedule

Duration	Context	▪ Content	LOs	ASs	Suggested Assessment	Resources
Term 1						Books Magazines Charts Photos Field charts Brochures Guidelines ARC-leaflets Multi media such as internet Electronic media - DVD, CD Models Videos Farming equipment Plant facilities Agricultural experts Excursions
1 week 4 hours	**Safety** ▪ OHS Act: Application ▪ General Safety Regulations ▪ Medical emergencies	▪ OHS Act: Reference to relevant workshop practices. ▪ General safety regulations: • Safe handling of more advanced tools (hydraulic and pneumatic). • Safety regarding electricity. • Road safety and roadworthiness. • Safe use of motorized farm equipment. • Fire fighting equipment for the prevention and control of fires of hazardous substances. • Safe use and storage of hazardous substances. ▪ First Aid • How to deal with medical emergencies in the workshop and on the farm	LO 3 & 4 LO 1	12.3.1 12.1.3	Class work Homework Worksheets Assignments Projects Case studies Informal test	
4 weeks 16 hours	**Energy** ▪ Alternative sources of energy generated by natural resources and renewable energy	▪ Alternative sources of electrical energy: • Solar systems, wind generator, hydro-electricity, geothermal. • Bio-energy (methane amongst others). • Batteries and care (used in fencing, tractors etc).	LO 1 LO 3&4 LO 2	12.1.1 12.3.4 12.2.1, 2	Class work Homework Worksheets Assignments Projects Case studies	

	Skills & Construction ▪ Drawings ▪ Tools and equipment ▪ Cost calculation	▪ Interpretation of drawings ▪ Drawings used in agriculture: • Sectioned views. • 1st and 3rd angle and isometric views. ▪ Skills used in handling of related more advanced tools: • Measurements. • Cutting, joining and bending. • Assembling. • Use of templates. • Finishing off. ▪ Construction processes: • Additional carpentry: Doors, door- and window frames: - Fitting of hinges, locks and glass (glazing). • Metal work: - Sheet metal work. - Arc-welding: more advanced joints and their applications. - Gas-welding: more advanced joints and their applications. - CO_2-welding: Components & setting of welding equipment. ▪ Effective use of tools and equipment due to correct measurements, calibrations and adjustments. ▪ Problem solving and applying of data collected from measurements and calculations for cost calculation	LO3&4 LO 2 LO 1 LO 3&4	12.3.8 12.3.9 11.2.1-5 11.1.1, 3, 5 11.3.9	Class work Homework Worksheets Assignments Projects Case studies Informal test Practical work	
	Fencing ▪ Electrical fences	▪ Basic knowledge, materials and use of electrical fences: • Electrical components: - energizers, energy sources and care, isolators • Supports, wires, posts, standards and droppers. • Maintenance.	LO 1 LO 2 LO 3&4	12.1.1, 3, 5 12.2.1-5 12.3.1, 3, 4, 8, 9		

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
5 weeks 20 hours	**Tools, Equipment and Implements** ▪ Specialised tools ▪ More advanced agricultural implements and equipment ▪ Measurements, calculations and calibration	▪ Safe handling of specialised and hydraulic and pneumatic tools. ▪ Purpose and use of specialised tools and equipment. ▪ Purpose and use of pneumatic and hydraulic tools. ▪ Effective use of tools, equipment and implements due to correct measurements, calibrations and adjustments. ▪ Purpose and effective use of specialized cultivation tools, equipment and implements: • Harvesting implements and equipment of plant and animal products, harvesters, silage cutter, balers, etc. • Milking, shearing, sorting, etc. ▪ Problem solving and applying of data collected from measurements and calculations for calibration.	LO 1 LO 3&4 LO 2 LO 3&4 LO 1 LO 3&4 LO 3&4	12.1. 3 12.1.5 12.3.5 12.2.1, 2 12.3.9 12.1.3 12.3.8 12.3.5 12.3.9	Class work Homework Worksheets Assignments Projects Case studies Informal test Practical work	Any applicable source from above list
	▪ Mechanised equipment ▪ Safety regulations ▪ Interpretation of drawings ▪ Cost and calculations ▪ Fault finding and problem solving of mechanised equipment	▪ Road safety and road worthiness ▪ Safe use of motorised farm equipment ▪ Interpretation of assembly and sectional drawings used in agriculture ▪ Problem solving and applying of data collected from measurements and calculations, interpretation of costs ▪ Electric motors: Star and delta motor (single & three phase) • Fault finding, problem solving, maintenance and care. ▪ Mechanised systems: (fault finding and problem solving) • The basic 2-stroke, 4-stroke or diesel engine systems: - ignition, cooling, lubrication and hydraulic, differentials, gears and chains. • Driving/lift/brake systems: - PTO, steering, wheels (bearings), 3-point coupling, braking (pneumatic & hydraulic).	LO 1 LO 3&4 LO 2 LO 3&4 LO 2 LO 3&4	12.1.3, 5 12.3.1 12.3.8 12.3.9 12.2.1-5 12.3.5 12.2.1-5 12.3.5		
	▪ Term test & Practical test	All work			Formal test	

Duration	Context	▪ Content	LOs	ASs	Suggested Assessment	Resources
Terms 2 & 3						
16 weeks 64 hours	**Skills and Construction Processes** ▪ Safety ▪ Drawings ▪ Tools and equipment ▪ Cost calculation	▪ Safety regulations ▪ 1st, 3rd angle and isometric drawings ▪ Effective use of tools and equipment due to correct measurements, calibrations and adjustments. ▪ Applying of data collected from measurements and calculations for cost calculation	LO3&4 LO 2 LO 1 LO 3&4	12.3.8 12.3.9 11.2.1-5 11.1.1, 3, 5 11.3.9	Class work Homework Worksheets Assignments Projects Case studies Informal test Practical work	Any applicable source from above list
	Materials: ▪ Metal preservation ▪ Timber treatment ▪ Materials for special use in an agricultural environment ▪ Fencing	▪ Materials, their protection and maintenance: • Metals: - Galvanise, plating, undercoat and painting. - Elements of nature. • Timber: - Treatment, painting and creosote. • Materials for special use: - Polymers: Polystyrene, PU-foam, Teflon and epoxy. - Ventilation (cooling and heating). - Insulation. • Materials used for electric fencing.	LO 3 LO 1 LO 3&4	12.3.2 12.1.1 12.3.2		
	Metal work: ▪ Gas-welding and arc-welding ▪ CO_2 welding	▪ Metal work: • Sheet metal work. • Arc-welding: more advanced joints and their applications. • Gas-welding: more advanced joints and their applications. • CO_2-welding: Components & setting of welding equipment.	LO 3&4 LO 2 LO 1 LO 3&4	12.3.2 12.3.3 12.2.1-5 12.1.5 12.3.9		
	Carpentry: ▪ Applicable to construction work	▪ Additional carpentry: • Doors, door- and window frames: - Fitting of hinges, locks and glass (glazing).	LO 3&4 LO 2 LO 1	12.3.2 12.3.3 12.2.1-5		

Duration	Context	▪ Content	LOs	ASs	Suggested Assessment	Resources
	Building: ▪ Construct cost efficient agricultural structures with special reference to different structural components and insulation	▪ Planning and maintaining of structures for plant production, (e.g. tunnels) curing and storage facilities: • Design, construction and production principles • Elements of nature and soil factors • Ventilation and insulation ▪ Effective use of computer technology information: temperature control.	LO 1 LO 2 LO 3&4	12.1.1, 3, 5 12.2.1-5 12.3.1, 3, 4, 8, 9 12.3.7		
2 weeks	**Mid Year examination**	All work completed during year			Examination	
2 weeks	**Prep examination**	All work completed during year			Examination	

Duration	Context	Content	LOs	ASs	Suggested Assessment	Resources
Term 4						
4 weeks 16 hours	**Irrigation and water management** Know & understand the effective use, purpose and maintenance of: ▪ irrigation systems ▪ water supply ▪ drainage systems ▪ waste water ▪ Drawings ▪ Measurements and calibration ▪ Computer technology ▪ Cost calculation	▪ Irrigation systems: fault finding, problem solving, maintenance and care: • Pumps • Water supply • Drainage systems • Waste water management. ▪ Drawings used in irrigation ▪ Effective use of tools, equipment and implements due to correct measurements, calibrations and adjustments ▪ Effective use of computer technology information: • Irrigation scheduling ▪ Problem solving and applying of data collected from measurements and calculations for interpretation of maintenance costs.	LO 1 LO 3&4 LO 2 LO 3&4	12.1.1, 5 12.3.6 12.2.1-5 12.3.8 12.3.9 12.3.7 12.3.9	Class work Homework Worksheets Assignments Projects Case studies Informal test Practical work	Any applicable source from above list
2 weeks	**Revision**					
3 weeks	**External examination**	All work completed during year			Examination	

ANNEXURE 3: EXAMPLE OF LESSON PLAN

Example of a Lesson Plan for Agricultural Technology

Teacher: **School:** _____

Duration of lesson: 1-2 weeks
Grade: 10
Class:

Learning Outcomes	Assessment Standards					
1	1	2	3	4	5	
2	1	2	3	4	5	
3	1	2	3	4	5	6
4	1	2	3	4		

Knowledge Area: Knowledge, principles and concepts of different irrigation pumps.

Sub-content: Pumps

Prior Knowledge

Assessment		**Strategies/Method of Assessment collection**		
Method	**Tools**	**Test based**	**Observation based**	**Task based**
Peer	Rubric	• Worksheet	•	• Assignment
Self	Checklist	•	•	• Practical report
Group	Memo	•	•	•

Teacher's actions	Learners' activities	Resources	Assessment Evidence	Estimated time
Introduction and explanation of types, concepts and terminology. Talk and chalk. Explain operation of pump.	**Activity 1: Theory** Group work on projects: ▪ Identification of different pumps and components. ▪ Uses of different pumps.	▪ Blackboard, ▪ Overhead ▪ Posters to illustrate cross section of different pumps ▪ Models	▪ Worksheet ▪ Assignment ▪ Formal assessment	3 Hours
Introduction and explanation of types, concepts and terminology. Dissemble and assemble model.	**Activity 2: Practical** ▪ Identification of different components of pumps. ▪ Use and operation of pump.	▪ Overhead ▪ Posters to illustrate cross section of different pumps ▪ Models	▪ Worksheet ▪ Assignment ▪ Practical report	2 Hours

Homework
Worksheets in which they inset information they obtained from relevant agricultural resources

- Practical Activity (Performance based)
- Develop pump for water supply

Expanded opportunities
- Learners get exposure to pump systems and processes as a source of energy.

Special needs
- Attend to those learners with barriers to learning. Slow learners guided with extra time

Enrichment
- Reporting skills, Research skills-finding facts about other types of pumps.