Specialist Agricultural Secondary Schools

South Sudan

Contents

Technical and Vocational Education and Training (TVET)

The future wealth of a country relies on the quality of vocational education that it offers. For the learner, vocational education is the route to employment and to an income. For the nation, vocational education is the route to national prosperity.

There has been a tendency in South Sudan to see vocational education as a second rate option. This misconception has to be challenged. Every nation needs its very best young people to take a vocational route and to supply the qualified people the nation needs to build the economy and build future prosperity. All economies in the world need more people with vocational education than with an academic education.

UNESCO defines TVET as:

"the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life"

TVET programmes differ from academic pogrammes because they lead to a vocational qualification and are:

- Focused on a particular employment sector
- Practical and work-related
- Flexible in their response to developing sector practices
- Endorsed by employers

This makes them particularly valuable to the leaner.

The provision of TVET in South Sudan

In South Sudan, TVET is organised by a range of state and private providers in the formal and informal sectors. The provision is through Vocational Centres, work-based placements and in schools and colleges. Learners enter TVET programmes from Primary School or though schemes to provide for those who have not been able to complete the Primary Leaving Certificate.

This booklet is about the TVET programmes offered by one of those providers: the specialist TVET Secondary Schools run by the Ministry of Education, Science and Technology (MoEST).

All courses are open to both genders and encourage the participation of girls and women. Courses cater for the whole range of people from those with high academic ability who have successfully completed their primary school course, to those who dropped out of school or were never able to attend.

TVET offers high status courses, valuable qualifications, and entry to employment. It also offers a route to higher education for those people who wish to continue their studies.

The range of courses being offered or developed is wide enough to suit the range of students and their different needs. The range of courses includes:

- Access or catch-up courses, and functional literacy and numeracy for those who have not successfully competed primary education
- Short, medium and long courses that lead to recognized sector qualifications for students who are starting at a higher level
- General courses that allow some students to survey a range of professional options before deciding on one

All courses are practical and industry-related, responding to the latest developments in the sector. They develop the necessary specific sector-related skills, and also the general knowledge, skills and attitudes that student need for employment and for life. Whilst equipping students for a specific vocation they also enable students to develop the capacity to develop and to adapt, and to become life-long learners.

The Vocational Qualifications Framework

Vocational courses fit within an overall Framework of qualifications that has five levels that equate with the years in mainstream schools.

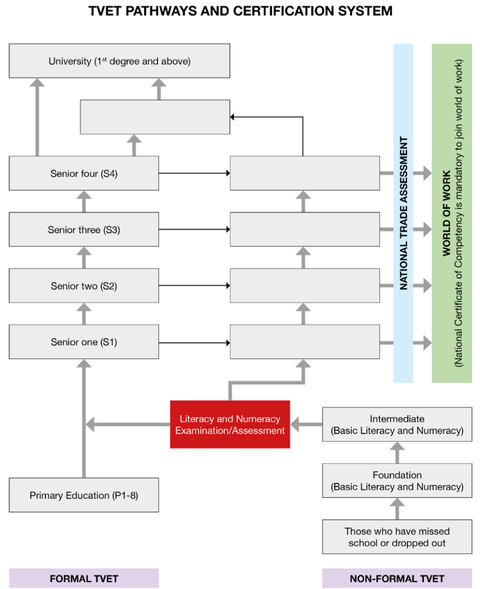
Vocational Level	Academic Equivalent
Level 1: Proficient	S1
Level 2: Artisan	S2
Level 3: Craft	S3
Level 4: Technician	S4
Level 5: Diploma	Polytechnic & colleges

The way this Framework operates is set out in the diagram.

The specialist TVET secondary schools offer Level 1 to Level 4. Each school year from S1 to S4 will lead to a recognized qualification at an appropriate level.

There is also the possibility of leaving school at the end of any year for the world of work or to continue vocational education in a Vocational Centre or College.

There is a set of descriptors that set out the expectations of each level.



Level	Certificate Types	Level Descriptors			
		Problem Solving Capabilities/ Information Processing	Level of Accountability, Responsibility and Autonomy	Level of Knowledge and Skills	Level of Tasks/ Operational Environment
Short Term Training	Foundation	• Carry out routine tasks	• Work under guidance	• Basic knowledge and skill	• No complexity of work, very routine level
	Intermediate				
1	Proficient	• Carry out simple tasks	• Work under direct supervision	• Basic general knowledge - • Ability to apply basic skills	• Competence to work on a defined range of activities under routine and predictable conditions • Low value of complexity, interconnection, in- transparency and dynamics; high degree of stability
2	Artisan	• Use relevant information; solve routine problems using simple rules and tools	• Some autonomy; work under supervision	• Basic factual knowledge of a field of work • Ability to apply basic cognitive and practical skills	• Competence to work on a range of varied activities in a clearly defined context • Average value of interconnection; low value of dynamics
3.	Craftsperson	• Solve problems by selecting and applying basic methods, materials and information	Responsibility for completion of work tasks; some leadership in solution of specific problems	Knowledge of facts, principles, processes and general concepts in a field of work Ability to apply a range of cognitive and practical skills	Competence to adapt own behaviour to circumstances in solving problems; competence to work in a range of roles in a variety of contexts • High value of interconnection, in-transparency and dynamics
4.	Technician	Generate solutions to specific problems in a field of work	Supervise the routine work of others; some responsibility for evaluation and improvement of work activities; leadership and guidance in organizing activities of self and others	Factual and theoretical knowledge in broad contexts within a field of work • Ability to apply expertise in a range of cognitive and practical skills	Competence in self-management within the guidelines of work contexts which are usually predictable, but subject to change; competence to work on a broad range of varied activities and in a wider variety of contexts, most of which are complex and non- routine • Considerably high degree of interconnection, in-transparency and dynamics

The subjects in Agricultural Schools

The pattern of subjects in the specialist TVET secondary schools is similar to the S3-4 pattern in mainstream schools. English, Maths, Religious Education and Citizenship are compulsory subjects.

Students will take a further three academic subjects from the list offered in mainstream schools. These subjects will be selected to fit with the vocational programme. The syllabuses and time allocated to all these options and the compulsory subjects will be the same as in mainstream schools.

The remaining time (15 periods) will be allocated to the vocational programmes.

All schools will also provide “school programmes” that cover sports and recreation, guidance and community involvement.

This pattern of curriculum will enable TVET school students to transfer to a mainstream school at the end of S2 or S3 if they so desire. Because they will have studied the same four compulsory subjects as mainstream students, they will be able to slot into S3 without a problem. They would then continue the three extra academic subjects they have been studying as their three S3-4 electives.

S1 - 4		
	Status	**Periods per wek (45 minutes each)**
English	Compulsory	5
Maths	Compulsory	5
Religious Education	Compulsory	2
Citizenship	Compulsory	2
School Programmes	Compulsory	2
Academic Options	3 x 3 periods (appropraite to vocational choice)	9
Vocational Options	15 periods	15
	Total	40

Timetables

Schools are free to decide the way in which time is allocated to the subjects. This will depend on the needs of the school and of the programmes. Most vocational programmes have a high practical element that cannot be fitted into a 45 minute period. Therefore schools will put periods together to make longer learning times.

The allocation of periods is for guidance, and the ratios between the subjects could be achieved over a longer period of time than a week.

It is likely that school will wish to allocate a whole morning or afternoon, or even a whole day to vocational programmes. The example below shows the afternoons being allocated to vocational programmes.

Of course, this could not work right across the school at the same time, so schools would need to arrange for other year groups to be engaged in vocational programmes in the mornings so that staff and facilities can be allocated effectively. An alternative would be to arrange all-day vocational sessions and spread them across the year groups.

These are only two examples to illustrate the extent of the possibilities here. It is up to schools to organise their own timetables in ways that best suit their needs and circumstances.

	Monday	Tuesday	Wednesday	Thursday	Friday
1					
2					
3					
4					
5					
6					
7					
8					

Key	Academic Subjects	Vocational Programmes

	Monday	Tuesday	Wednesday	Thursday	Friday
1					
2					
3					
4					
5					
6					
7					
8					

Assessment

Assessment of the vocational programmes will be mainly practical, and will be made in accordance with the expected Learning Outcomes set out in the syllabus modules.

Each module also has an “Assessment” section that sets out the sort of evidence expected that a student has met the Learning Outcomes. For example:

Taxation	
S3 Taxation	**Module 4: Business Profit Tax**
Description	By the end of this unit learners will be able to calculate the tax to be paid by a taxable business
Learning Outcomes	1. Understand the basis and application of business profit tax 2. Calculate the tax to be paid by a business on its profits
Elements	Business profit tax as applied in South Sudan and other East African countries
Learning strategies	1. Research from business owner how his/her profit are shared 2. Practice calculation of business profit tax from given exercises
Assessment	1. Written and/or oral explanation of business profit tax 2. Correctly calculate business profit tax

In this example, to find out whether a student “Understands the basis and application of business profit tax”, it will be necessary for her or him to give a written or oral explanation. The “Elements” section indicates the amount of understanding expected: in this case how the tax is applied in South Sudan and other East African Countries.

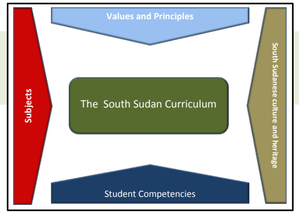
It is important to note that assessments do not always have to be written. Oral evidence is often more valid, and give the teacher the opportunity to probe understanding further. Assessments can also be made as part of the normal process of learning. In the above example, the “Learning Strategies” section suggests that learners should “Practice calculation of business profit tax from given exercises”. These exercises will give the teacher good evidence of whether the student can calculate the tax accurately.

Assessment can be both formative to guide learning as it progresses, and summative to determine the extent of learning at the end of a year or programme. Teachers will use formative assessment on an ongoing basis to guide learning.

Summative assessment involves an overall judgement of a student’s learning at the end of a module or course.

Because the Vocational Courses in the specialist TVET Secondary Schools are designed to lead on to higher education, the assessment of each level will not necessarily be appropriate for students deciding to leave the course part way through to seek employment. In these cases the students will need to take the qualification assessments used in Vocational Centres and Colleges.

Vocational Programme Overviews



These Vocational Programme Overviews are part of the broader structure of the new curriculum for schools, and should be read alongside the Curriculum Framework. This new curriculum sets out key aims that define what the nation wants for its young people, and these apply to vocational programmes as well as academic subjects. We want young people to become:

- Good citizens of South Sudan
- Successful life-long learners
- Creative and productive individuals
- Environmentally responsible members of society

The new curriculum also put the academic subjects and vocational programmes into a broader context of values, principles, student competencies and the rich culture and heritage of South Sudan. These are all explained in the Curriculum Framework.

The Student Competencies set out in the Curriculum Framework apply to vocational programmes as well as academic subject. In fact, they are the very competencies that employers look for in their employees:

Critical and creative thinking

- Plan and carry out investigations, using a range of sources to find information
- Sort and analyse information and come to conclusions
- Suggest and develop solutions to problems, using their imaginations to create new approaches
- Evaluate different suggested solutions

Communication

- Read and write fluently
- Speak clearly and communicate ideas and information coherently
- Listen to and comprehend speech in a variety of forms
- Comprehend and read critically a variety of types and forms of texts
- Use a range of media to communicate messages, ideas and opinions

Co-operation

- Work collaboratively towards common goals
- Be tolerant of others and respectful of differing views
- Adapt behaviour to suit different situations
- Negotiate, respecting others' rights and responsibilities, and use strategies to resolve disputes and conflicts

Culture & Identity

- Take pride in South Sudanese identity
- Build understanding of South Sudanese heritage in relation to the wider world
- Appreciate and contribute to South Sudanese culture

These four student competencies have been built into the vocational programmes and are a key part of young people's development as members of a workforce that will build the prosperity of South Sudan.

Specialist Agricultural Secondary Schools - Introduction

The Syllabus Modules

Each syllabus is divided into modules, and each module is set out in terms of:

Programme	The overall vocational programme
Module Title	The title of the module
Description	The key learning of the module
Learning Outcomes	What the learning is expected to be able to do, know and understand by the end of the module
Elements	The extent of the sector learning that is required
Learning Strategies	The experiences needed to achieve the learning outcomes
Assessment	The ways in which it will be determined whether or not the learning outcomes have been achieved

The full syllabuses are available in a separate document.

Agricultural Schools

Agricultural Economics	S1-S4	9 Modules	105 hours
Agricultural Engineering	S1-S4	14 Modules	275 hours
Agricultural Extension and Research	S4	4 Modules	80 hours
Agro-forestry	S4	3 Modules	65 hours
Animal Production	S1-S4	18 Modules	349 hours
Bee Keeping	S3	2 Modules	65 hours
Crop Production	S1-S4	18 Modules	363 hours
Food Technology and Processing	S2	2 Modules	44 hours
Horticulture	S1-S3	8 Modules	154 hours
Soil Science	S1-S3	4 Modules	93 hours

Agricultural Schools: Crop Production (363 hours)			
S1	**S2**	**S3**	**S4**
1.**Principles of Crop Production** Understand the factors influencing crop production 2.**Importance of Land Preparation** Carry out land preparation in the field 3. **Arable Farming** Carry out crop farming in the field 4. **Methods of Farming** Carry out farming systems in the field 5. **Farming Systems** Carry out farming systems in the field. 6. **Role of Agriculture in Development of the Republic of South Sudan** Understand the role of agriculture in the development of he Republic of South Sudan. 7. **Farm tools and equipment** Identify, use and repair farm tools **144**	1. **Planting** Carry out different planting methods in the fields 2. **Crop rotation** Understand the importance of crop rotation and demonstrate crop rotation in the fields 3. **Field Crops** Plant various field crops **76**	1. **Forage crops** Manage forage crops in the field 2. **Fodder crops** Manage fodder crops in the field 3. **Weeds & weed control** Identify and control weeds **63**	1. **Crop Pests & Diseases** Identify crop pests and apply chemicals to control them in the field 2. **Crop Diseases** Identify crop diseases and practice application of chemical to control them 3. **Crop Improvement** Plant crops to increase yields 4. **Forage conservation** Carry out forage conservation in the field 5. **Sustainable land management** Recognise and apply the principles of sustainable land management **80**

Agricultural Schools: Animal Production (349 hours)			
S1	**S2**	**S3**	**S4**
1. **Principles of animal husbandry** Understand the importance of livestock and carry out simple management practice 2. **Livestock breeds** Distinguish different types of livestock and different breeds and to match them to their uses 3. **Anatomy and physiology** Identify different parts of animal body and explain their functions 4. **Livestock production systems** Understand the benefits and constraint of livestock production system and choose the best one related to their environment **74**	1. **Animal nutrition** Understand animal feed nutrients and their function in the animal body 2. **Beef production** Identify and fatten beef cattle 3. **Dairy production** Carry out simple dairy management practices for higher quality and quantity milk production 4. **Goats and sheep production** Carry out goat and sheep breeding and management practices 5. **Fishing & fish gears** Carry out fishing practice **102**	1. **Hatchery & brooder management** Manage hatcheries and egg production 2. **Egg production** Understand production systems and manage layers 3. **Broiler production** Understand production systems and manage broilers. 4. **Fish farming** Carry out fish farming practices 5. **Pig production** Carry out pig breeding and management practices **108**	1. **Milk processing** Carry out different processing methods and produce high quality milk products 2. **Meat processing** Carry out slaughtering and processing of meat in hygienic manner 3. **Hides and skins** Produce and preserve high quality hides and skin 4. **Feed production and preservation** Carry out feed and pasture preservation and storage 5. **Animal Health** Apply preventive measures, diagnose, and administer treatment **65**

Agricultural Schools: Agricultural Engineering (275 hours)			
S1	**S2**	**S3**	**S4**
1. **Introduction to agricultural engineering** Understand the importance of agricultural engineering, mechanisation and farm structure in South Sudan 2. **The engine of agricultural tractor** Understand the functions of the major parts and understand the mode of operation of a tractor engine 3. **Carpentry, masonry, workshop and plumbing tools & equipment** Understand the functions and maintenance of various farm carpentry, building, masonry and plumbing tools and equipment 4. **The tractor system** Understand the systems of an agricultural tractor in relation to their functions and principles of operation 5. **Tractor routine care and maintenance** Carry out routine care and maintenance of a tractor engine **85**	1. **Tractor drawn/mounted implements** Understand the function of various tractor drawn implements and attachments and manual planting and processing machines 2. **Maintenance and repair of tractor** drawn / attached farm implements Maintain and repair various tractor drawn attachments and implements. 3. **Animal traction (ox-cultivation)** Select and train oxen for work 4. **Measurement of fields and Survey** Measure fields and conduct field surveys and levelling correctly. **80**	1. **Irrigation, drainage and farm water supply and water pollution** Understand the methods of irrigation and the prevention of water pollution 2. **Soil and water conservation** Understand the process of soil erosion and the various methods used in soil and water conservation **45**	1. **Farm structure and layout** Construct and maintain a range of farm structures 2. **Farm power** Understand the sources of farm power, their advantages and disadvantages and limitations. 3. **Mechanization** Appreciate the importance of agricultural mechanisation to farming in South Sudan and understand how it can be further developed. **65**

Agricultural Schools: Agricultural Economics (105 hours)			
S1	**S2**	**S3**	**S4**
1. **Introduction to Agricultural Economics** Apply principles and practices of record keeping in a school farm. **2. Farm planning and farm budgeting** Plan a school farm and conduct budgeting for the farm operations **18**	1. **Land tenure and land reform in South Sudan** Understand land tenure and the land tenure systems in South Sudan and the suggested land reforms **2. Production economics** Understand production economics, the factors of production, and the risks and uncertainties involved in agricultural and their possible solutions. **24**	**1. Agri-business & Marketing** Market agricultural commodities and identify the different sources of markets and marketing institutions in South Sudan. **2. Farm accounts** Understand the importance of farm accounts, differentiate the books of farm accounts and efficiently apply farm accounts. **3. Farmers' organisations** Identify the different organizations of farmers and the role(s) they play to the farmers. **63**	**1. Rural Development programs and credit agencies** Understand the meaning of rural development program and credit agencies and their role(s) in South Sudan. **2. Project planning, appraisal and implementation** Plan and implement a project in a community **50**

Agricultural Schools: Soil Science (93 hours)			
S1	**S2**	**S3**	**S4**
1. Organic manure Improve soil fertility by the use of organic manure **32**	**1. Inorganic fertilizers** Improve soil fertility by the use of inorganic fertilizers **19**	**1. Fundamentals and practices of soil science** Understand fundamentals and practices of soil science and its importance to agriculture, soil formation, soil fertility and soil degradation. **2. Soil fertility and fertilizer application** Understand plant nutrition and the factors influencing mineral availability in soil. **63**	

Agricultural Schools: Horticulture (154 hours)			
S1	**S2**	**S3**	**S4**
1. Nursery and field practices Understand how to plant, prune and harvest horticultural crops **2. Introduction to horticulture** Understand plant structures and the need for crop rotation **3. Production of vegetable crops** Cultivate and care for vegetable crops **52**	**1. Stimulant crops** Cultivate and care for stimulant crops **2. Production of fruit crops** Cultivate and care for fruit crops **3. Beverages, spices and stimulants.** Cultivate and care for beverage crops **60**	**1. Ornamental plants** Cultivate and care for ornamental crops **2. Medicinal & aromatic plants** Cultivate and care for medicinal and aromatic crop plants **42**	

Agricultural Schools: Short Programmes (231 hours)			
S1	**S2**	**S3**	**S4**
	Food Technology and Processing **1. Food Technology** Understand the elements of processing and preserving food and the need for hygiene and food safety **2. Traditional food processing** Compare and contrast modern and traditional methods of food processing and production **44**	**Bee Keeping** **1. Introduction to apiculture** Understand the biology and ecology of bee keeping and manage a bee hive **2. Honey processing & value addition** Understand honey & wax processing methods and add value to the products **42**	**Agro-forestry** **1. Importance of Agro forestry in South Sudan** Understand the importance of agro-forestry to South Sudan **2. Forms of Agro forestry** Understand the various forms of agro-forestry in South Sudan and select appropriate trees for different & multi-purpose uses. **3. Agro-forestry principles and practice** Understand the basic principles of agro-forestry and be able to apply the practices of agro-forestry for different purposes and uses. **65**
			Agricultural Extension & Research **1. Rural Sociology** Understand impact of government agricultural training works on the attitudes and behaviours in rural farming societies **2. Agricultural Extension** Use agricultural extension as a tool to help farmers help themselves and describe communication methods in agricultural extension. **3. Agricultural Research and Education** Use agricultural research findings for advice to farmers **4. Agricultural shows and exhibitions** Understand the importance of agricultural shows to farm development **80**

Programme Modules

Agricultural Economics

S1	Module 1: Introduction to Agricultural Economics
Description	By the end of this module the learners should understand agricultural economics and apply principles and practices of record keeping in a school farm.
Learning Outcomes	1 Understand the principles of agricultural economics 2. Understand the importance of keeping farm records in a school farm 3. Demonstrate the use of farm records in a school demonstration farm
Elements	**Define:** agriculture, economics. **Principles:** production, resources, choice **Farm records:** crop production, livestock, labour, inventory **Demonstration:** school farm, funds, generated records, income & expenditure
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups and presentations for learning outcomes 1 to 3. 2. Students should observe and practice the practical application of farm record-keeping in a small school demonstration farm.
Assessment	1. Written or oral explanation of covering learning outcomes 1 and 2. 2. Portfolio evidence showing the production of farm records (facts and figures) in a school demonstration farm giving at-least 2 farm records.

S1	Module 2: Farm Planning and Farm Budgeting
Description	By the end of this module the learners should be able to plan a school farm and conduct budgeting for the farm operations.
Learning Outcomes	1 Understand a budget the budgeting process 2. Understand the advantages and the problems faced on making a budget 3. Formulate a farm plan & budget 4. Apply and monitor a school farm budget
Elements	**Budget:** estimated cost, estimated income **Budgeting:** farm plan, farmer's own date, date from other group(s)/organizations, experimental data, farm management expert data **Advantages:** planning, profitability **Formulate:** calculating expected income & expenditure, expected credit & debt, profit & loss
Learning Strategies	1. Brainstorm, group research work and written / power-point presentations for learning outcomes 1 - 3. 2. Group work for formulation of a school farm plan & budget. 3. Students should observe and practice the practical application and monitoring of a school farm budget.
Assessment	1. Written or oral explanation of covering learning outcomes 1 and 2 2. Portfolio evidence showing the production and presentation of a proper farm plan and budget for learning outcome 3. 3. Portfolio evidence showing the production of timely farm reports covering farm operations, budget application and monitoring for learning outcome 4.

S2	Module 1: Land tenure and land reform; in South Sudan
Description	By the end of this module the learners should understand land tenure and the land tenure systems in South Sudan and state the suggested land reforms.
Learning Outcomes	1. Understand the system of land tenure systems in South Sudan. 2. Understand the advantages / disadvantages of the various land tenure systems in the country 3. Understand the reasons for carrying out land reforms in the country 4. Understand the impact of settlement / resettlement of people on agricultural productivity across the South Sudan
Elements	**Tenure systems:** individual land ownership, communal ownership, co-operative, leasehold & fragmentation. **Reforms:** justifications, systems (land consolidation, settlement / resettlement)
Learning Strategies	1. Group work assignments and presentations for learning outcomes 1 to 4 2. Students conduct research in groups to investigate the impact of settlement /resettlement on agricultural productivity in a designated area.
Assessment	1. Written or oral explanation of learning outcomes 1 to 3. 2. Report presentation of research covering impacts of settlement/resettlement covering learning outcome 4

S2	Module 2: Production Economics
Description	By the end of this module the learners should be able to explain production economics and state the reasons / factors for production, and the risks / uncertainties involved in agricultural and their possible solutions.
Learning Outcomes	1. Understand the basic principles of agricultural economics 2. Understand the reasons, factors & functions of production. 3. Understand the concept of demand and supply. 4. State the common risks & uncertainties associated with agricultural production and their possible solutions.
Elements	**Production:** human beings, resources, goods & services **Principles:** law of diminishing returns, law of substitution, equi-marginal returns, profit maximization **Functions:** increasing returns, constant returns, decreasing returns **Concepts:** Demand (relationship of price & quantity, demand, types, factors influencing demand elasticity), supply (schedule & supply curve, factors affecting, supply, supply price elasticity) **Risks & uncertainties:** pests, diseases, manpower, weather, prices, natural disasters
Learning Strategies	1. Group work to discuss and explain the concept of production economics. 2. Group assignment and classroom presentations covering the basic principles of agricultural economics. 3. Practical assignments / exercises reflecting application of learning outcome 2. 4. Working in buzz groups to use a range of sources to explain the reasons, factors & functions for production. 5. Lecturing and illustration about the concept of demand and supply. 6. Working in groups to investigate the common risks & uncertainties associated with agricultural production and their possible solutions.
Assessment	Written or oral explanations covering learning outcomes 1 to 4.

S3	Module 1: Agri Business and Marketing
Description	By the end of this module the learners should be able to market agricultural commodities and identify the different sources of markets and marketing institutions in South Sudan.
Learning Outcomes	1. Understand the concept of farming as a business 2. Distinguish between a market and marketing process 3. Investigate the various types of markets and the market functions 4. Understand the process of setting prices in the market and the market decision making process 5. Identify the problems in marketing agricultural commodities and suggested solutions 6. Identify the different marketing institutions in South Sudan
Elements	**Market:** types of market (local, international), market competition **Marketing Process:** exchange & price functions, physical functions & facilitating functions **Setting Prices:** amount of money charged, exchange of goods / services, equilibrium price & price control **Marketing institutions:** market boards, agents (Itinerant, retailers, wholesalers, brokers, commission agents,), institutions (processors, credit, research)
Learning Strategies	1. Group work and plenary discussion, role play / business simulations for learning outcomes 1 to 5. 2. Students visit a nearby market and investigate the problems faced in marketing agricultural commodities and the suggested solutions. 3. Working in groups using a range of sources to find out the various marketing institutions across the country (South Sudan).
Assessment	1. Written or oral explanation of covering learning outcomes 1 to 6. 2. Market research report including oral presentation covering learning outcomes 3, 5 and 6

S3	Module 2: Farm Accounts
Description	By the end of this module the learners should Understand the importance of farm accounts, differentiate the books of farm accounts and efficiently apply farm accounts.
Learning Outcomes	1. Understand the importance of farm accounts 2. Differentiate the use of various financial documents and books of accounts 3. Create financial statements for a farm institution
Elements	**Documents:** invoice, statement of accounts, cash sale/receipt, delivery note, local purchase order **Accounts:** ledger book, journal book, invent;2tory book, cash book **Statements:** cash flow, balance sheet, profit & loss accounts
Learning Strategies	1. Group work and presentation for learning outcome 1 and 2. 2. Students should observe and take part in a practical assignment in an existing school farm for learning outcome 3.
Assessment	1. Written or oral explanation of learning outcomes 1 and 2. 2. Portfolio evidence showing the creation and use of financial statements for a farm institution covering learning outcome 3.

S3	Module 3: Farmers' Organisations
Description	By the end of this module the learners should be able to identify the different organizations of farmers and the role(s) they play to the farmers.
Learning Outcomes	1. Identify the various farmers' organizations 2. Understand the role(s) of the different organizations of farmers in South Sudan 3. Understand the set up of the various farmers' organizations
Elements	**Organizations:** cooperatives, unions, statutory boards **Role(s):** reduction of marketing costs, collection of produce, storage of produce, raising revenue, provision of employment, capacity building **Set up:** need for the organization, financing, management, facilities, steps
Learning Strategies	1. Students work in groups using a range of sources to investigate the various farmers' organizations, their role(s) and setup across the country (South Sudan) covering all elements.
Assessment	1. Research report including presentation covering learning outcomes 1 to 3;

S4	Module 1: Rural Development Programmes and Credit Agencies
Description	By the end of this module the learners should understand the meaning of rural development program and credit agencies and their role(s) in South Sudan.
Learning Outcomes	1. Understand the meaning of rural development program & credit agency. 2. Identify the different rural development programs and credit agencies including their role in South Sudan. 3. Understand the factors limiting the success of rural development programs & credit agencies in South Sudan
Elements	**Factors:** insecurity, illiteracy, Inadequate credit facility, poor infrastructure. **Programs:** modernization of agriculture, South Sudan Agricultural Revitalization Program (SSARP), South Sudan Agricultural Development Program (SSADP)
Learning Strategies	1. Students work in groups using a range of sources to find out the meaning of rural development program & credit agency, identify such programs / agencies and investigate the role(s) they play and the factors limiting their success.
Assessment	1. Research report including oral presentation giving two (2) examples of development programmes and credit agencies showing their role(s), problems faced and suggested solutions for their limitations covering learning outcomes 1 to 3.

S4	Module 2: Project planning, appraisal and implementation
Description	By the end of this module the learners should be able to define a project in a community and undertake its implementation.
Learning Outcomes	1. Understand the principles / procedures of project design and execution 2. Understand the different roles being conducted by the different project actors in project execution 3. Apply the different stages of implementing a project and render report(s)
Elements	**Principles:** vision & mission, business objective, standard of engagement, intervention and execution strategy, organizational alignment, measurement, accountability **Actors:** coordinators, clients, local authority, consultants, farmers **Stages:** preparation, definition, Implementation, conclusion
Learning Strategies	1. Working in groups using a range of sources to define a project, describe the principles of project / its execution and the roles being played by the different project actors. 2. Field attachment / internship for learners to existing project actors.
Assessment	1. Project report and oral presentation showing all stages of project implementation for all elements in learning outcomes 1 to 3 gathered through the field attachment.

Agricultural Engineering

S1	Module 1: Introduction to Agricultural Engineering
Description	By the end of this module the learner should understand the importance of and distinguish the branches of agriculture engineering, mechanisation and farm structure in South Sudan.
Learning Outcomes	1. Understand the importance of agricultural engineering, mechanisation and farm structure in South Sudan 2. Distinguish the branches of agriculture engineering
Elements	**Importance of agricultural engineering:** general efficiency in farm production, cost effectiveness **Branches:** agriculture engineering, agricultural mechanization, farm power and farm mechanics, farm structures, animal handling layouts, farm buildings
Learning Strategies	1. Work as a group to discuss differences between small traditional and large modern farms to understand the importance of agricultural engineering, mechanisation in South Sudan. 2. Work as a group to research the branches of agricultural engineering, their uses and dis/advantages.
Assessment	1. Research Report and oral presentation showing the student can understand the importance of agriculture engineering, mechanisation and farm structures by providing two (2) examples of each element for learning outcome 1. 2. Research Report and oral presentation showing the student can distinguish branches of agricultural engineering providing three (3) examples of each element for learning outcome 2.

S1	Module 2: The engine of the agricultural tractor
Description	By the end of this module the learner should understand the functions of the major parts of a tractor engine and describe the mode of operation of the external combustion engine and the internal combustion engine.
Learning Outcomes	1. Classify heat engines and tractors 2. Outline the functions of engine parts 3. Understand the working principles of various engines 4. Carry out the maintenance of a tractor engine
Elements	**Classify:** internal combustion engines into reciprocating, rotary and wankel engines, compression ignition, spark ignition engines, internal combustion engines e.g. steam engines **Engine parts:** Cylinder, cylinder Liner, cylinder block, Cylinder head, crankcase, piston, gudgeon pin, piston rings for oil and compression, connecting/piston rod, bearings (roller, piece, ball and main bearings), crankshaft, camshaft, valves, tappets/lifters, crankcase and fly wheel with reference to their types , functions and working relations **Working principles:** Two stroke engines, four stroke engines, petrol engines, diesel engines, water cooled engines, air cooled engines, engine with combined cooling systems, firing order of 1 to 8 cylinder engines, volume clearance, top dead centre, bottom dead centre, compression ratio **Maintenance:** oil, spark plugs, radiator coolant, air filter, lights, tyre pressure, brake fluid, brakes, battery check, oil filter, petrol filter, fan belt, drive belts, greasing points, tyre nipples, hydraulic system, nuts and bolts, three point linkage, draw bar
Learning Strategies	1. Work as a team to research using a range of sources and discuss the different types of heat engines and tractors. 2. Work as a team to identify and explain the different functions of parts of an engine. 3. Use various sources/models to explain the working principles of range of engine types. 4. Observe teacher demonstrations, take part in field trips, and practice hands on experience of changing oil, filters, spark plugs etc… using appropriate procedures and safety instructions to maintain and repair engine.
Assessment	1. Research report and oral presentation showing the classification of heat engines by providing two (2) examples of each element for learning outcome 1. 2. Research report and oral presentation showing student can outline the different functions of parts of heat engines by providing two (2) examples of each element for learning outcome 2. 3. Research report and oral presentation on the working principles of various engines by providing four (4) examples as per elements in learning outcome 3. 4. Practical demonstration showing the student can carry out the maintenance of a tractor engine covering all elements for learning outcome

S1	Module 3: Carpentry, Masonry and Plumbing tools and equipment
Description	By the end of this module the learner should understand the functions and forms of farm carpentry, building, masonry and plumbing tools and equipment.
Learning Outcomes	1. Understand the use of various workshop, carpentry, masonry, and plumbing tools and equipment correctly 2. Outline the functions of each of the parts of workshop, carpentry, masonry, and plumbing tools and equipment 3. Use appropriately the workshop, carpentry, masonry and plumbing tools and equipment 4. Maintain and repair workshop, carpentry, masonry and plumbing tools and equipment
Elements	**Workshop Tools and equipment:** hand saw, tenon saw, hack/coping saw, compass/key hole saw, rip saw, bow saw, wood chisel and cold chisel, single cut file and double cut file, rasp, wire brush, marking gauge, sand paper, divider, centre punch, spoke shave, screw drivers (Star and feat screw driver),jack plane **Masonry tools and equipment:** try square/mason's square, sash clamp, clamp and vices, mallet, soldering gun, tin-snip, hammer (claw, ball pein ,and sledge hammer),paint brush, wire strainer, pliers and pincer, brace and bit (hand drill),spanner (adjustable, open ended, ring, socket and tubular spanners). **Plumbing tools and equipment:** pipe wrench, pipe die, pipe wrench and pipe cutter. **Carpentry tools and equipment:** leveling rod, surveyor see through or theodolite, spirit level, masons' trowel, wood float/metal float, crow bar, plumb bob, oilstone and oil can, greasing gun.
Learning Strategies	1. Work as a team to carry out routine drawing and labelling of a range of workshop, carpentry, masonry and plumbing tools and equipment. 2. Students should observe demonstrations to use appropriate tools to grasp the functions of each of the parts of workshop, carpentry, masonry, and plumbing tools and equipment. 3. Students should observe demonstrations to handle a range of tools that will be required for specific tasks. 4. Work as a team to practice routine care and maintenance of workshop, carpentry, masonry and plumbing tools and equipment.
Assessment	1. Written or oral explanation of covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing that students can use four (4) carpentry, four (4) masonry and four (4) plumbing tools and equipment covering learning outcome 3 3. Portfolio containing observation checklists showing that students can maintain and repair two (2) carpentry, two (2) masonry and two (2) plumbing tools and equipment covering learning outcome 4.

S1	Module 4: Tractor Systems
Description	By the end of this module the learner should understand the systems of an agricultural tractor in relation to their functions and principles of operation
Learning Outcomes	1. Understand the functions of the various tractor systems 2. Describe the construction of systems of the agricultural tractor 3. Discuss the principles of operation of the various tractor engine systems 4. Dismantle and assemble the various systems of an agricultural tractor
Elements	**Fuel system:** Diesel and petrol engine fuel systems with reference to fuel tank, fuel lift pump, fuel filters, Fuel injector pump, fuel injectors/atomisers, air bleeding, the governor, Sediment bowl, carburetor **Cooling system:** Coolants, air, water and combined cooling systems, radiator, hose pipes, thermostat and water pump Lubrication system: Lubricants, SAE number, force feed, splash and High pressure lubrication system and dip stick **Electric system:** Battery, starter, charging circuit, dynamos, alternators, control box, ignition, i.e battery and magneto, Spark plugs, horns and gauges, lighting, gauges and dash board and controls in the cabin of the agricultural tractor **Transmission system:** Clutch, transmission gears, drive-line, driving axle air intake and exhaust, wheels, differential, final drive), valves, tyres and inner tubes and steering **Chassis and frame suspension system:** Chassis, frame, leaf and coil springs, shock absorbers, brakes, hydraulics, PTO, belts and pulleys **Construction:** tractor systems, how each part fits to each other to function efficiently **Principles of operation** of the system of the agricultural tractor. **Dismantle and reassemble** parts of agricultural tractor systems
Learning Strategies	1. Work in groups to discuss ways in which various systems of an agricultural tractor system works. 2. Work in groups to study the basis of construction of systems of an agricultural tractor. 3. Study the basis of functions of each in order to understand the principles of with which these various tractor engine systems works. 4. Students should observe demonstrations of procedures and safety instructions together with use correct spanners on how to dismantle and assemble various tractor systems.
Assessment	1. Written or oral explanation of covering learning outcomes 1 to 3. 2. Portfolio containing observation checklists showing that students can dismantle and assemble the two (2) systems of an agricultural tractor covering 4 elements in learning outcome 4

S1	Module 5: Tractor Safety
Description	By the end of this module the learner should be able to identify road signs and markings and traffic signals and follow safety regulations in using agricultural machinery
Learning Outcomes	1. Identify road signals, markings and traffic signals 2. Understand the need for safe practice when using an agricultural tractor and machinery 3. Practice safe practice when using an agricultural tractor and machinery
Elements	**Road signs, markings and traffic signals:** mandatory speed limit, weight limit, total prohibition, main road ahead, mandatory and cautionary police traffic road signs, rough road /hump, level crossing without gates ,railway crossing, stop, zebra crossing, traffic police signals, chevron markings on the roads, traffic lights. **Safe practices:** handle machinery with care, be aware of others in the vicinity, drive with caution being aware of ground conditions
Learning Strategies	1. Research on road signals, markings and traffic signals by using books and checking these on roads. 2. Present safe practices when using agricultural tractor and machinery 3. Observe and practice safe practices at all times when using tractor systems
Assessment	1. Written or oral explanation of covering learning outcome 1. 2. Research report and presentation showing that the student understands the need for safe practice proving two (2) examples of each element in learning outcome 2. 3. Portfolio of evidence containing observation checklists showing the student practicing safe practices when working with tractors for learning outcome 3.

S2	Module 1: Tractor drawn/mounted farm implements
Description	By the end of this module the learner should be familiar with the various tractor drawn implements/attachments and manual planting and processing machines, their parts, functions and uses
Learning Outcomes	1. Classify various tractor drawn and mounted implements 2. Describe the use of the various parts of the implements 3. Enumerate the functions of the various parts of the tractor drawn/mounted farm implements
Elements	**Primary cultivation implements:** rotary, disc i.e. cut away or pain discs and moldboard ploughs and tined implements e.g. sub soilers and chisel ploughs **Secondary cultivation implements:** Harrows and cultivators i.e, rigid tine, ring tine or rotary and disc harrows, drag harrows i.e. zigzag, chain, spike tooth, spring tine and rigid tine and blade harrows **Tertiary cultivation implements:** ridgers, pulverisers, rollers and levellers **Planting implements:** planters and seed drills e.g. manual jab planter, unit planter, automatic type potato planter and sugar cane planter Weeding implements: thermal weeding machines and rotary mowers **Fertilizer and pesticide applicators:** Sprayers, dusters, and fertilizer applicators **Harvesting machines:** maize and wheat combine harvesters, forage harvesters and groundnut diggers **Processing machines:** grinding mills both hammer and plate, crushing roller millers for maize and groundnuts. **Manual operated processing machines:** rice polishing mills, rice threshers and hullers, coffee hullers, sugar cane squeezers, maize shellers, coffee pulpers, oil seed pressers, grain mini dehullers and groundnut decorticators.
Learning Strategies	1. Work as a team to research using a range of sources and discuss the different types of tractor drawn and mounted implements. 2. Work in groups to study the basis of construction of the different types of tractor drawn and mounted implements. 3. Research on use appropriate tools to grasp the functions of each of the parts of tractor drawn and mounted implements.
Assessment	1. Written or oral explanation of showing that the student can classify, describe and mention the functions of six (6) sources of tractor drawn and mounted implements, for all elements in learning outcomes 1, 2 and 3

S2	Module 2: Maintenance and repair of tractor drawn / attached farm implements
Description	By the end of this module the learner should be able to maintain and repair various tractor drawn /attachments implements.
Learning Outcomes	1. Maintain various tractor drawn /attachments implements 2. Make minor repairs of various tractor drawn /attachments implements
Elements	**Attachments:** Harrows, cultivators, ridgers, pulverizes, rollers, levelers, planters and seed drills ,thermal weeding machines ,rotary mowers, sprayers, dusters, and fertilizer applicators, maize and wheat combine harvesters, forage harvesters and groundnut diggers, grinding mills both hammer and plate, crushing roller millers for maize and groundnuts, rice polishing mills, rice threshers and hullers, coffee hullers, sugar cane squeezers, maize shellers, coffee pulpers, oil seed pressers, grain mini dehullers and groundnut decorticators
Learning Strategies	1. Work in groups with assorted tools and spanners to practice routine maintenance of various tractors drawn /attachments implements. 2. Work in groups with assorted tools and spanners to practice routine repairs of various tractors drawn /attachments implements.
Assessment	1. Practical test using an observation checklist showing that the student can maintain and repair tractor drawn /attachments implements for all elements in learning outcome 1 and 2.

S2	Module 3. Animal Traction (Ox Cultivation)
Description	By the end of this module the learner should be able to select and train oxen for work and describe the various animal drawn implements/attachments, their parts, functions, uses, care and maintenance and compare and contrast between the tractor drawn implements and animal-drawn implements and demonstrate kindness towards work animals as in the criminal code of South Sudan laws against maltreatment and cruelty to dumb work animals.
Learning Outcomes	1. Train oxen for work 2. Use ox- drawn implements for various far activities like cultivation, maintenance of crops in the field and processing of crops 3. Compare and contrast between tractor drawn implements and animal-drawn implements. 4. Care for working oxen
Elements	**Oxen:** selection, casting, restraining, training **Train:** yokes, halters, chains, feedstuffs, water **Ox-drawn implements:** Ox-mouldboard plough, ox-tool bar and ox-tool frame /multi-purpose frame e.g. ariana tool bar, ox-cultivator, ox-drawn ridger, ox-harrower, ox-Line tracer, ox-planters/seeders and fertiliser applicator, ox-weeders, o –harvester e.g. ox-groundnut digger, ox-sugar cane squeezer, ox-water lifters and ox-cart **Care of working oxen:** South Sudan Penal Code on maltreatment of dumb work animal document
Learning Strategies	1. Work in groups in training oxen/draught animals. 2. Work in groups and use various ox- drawn implements. 3. Research on ox-drawn and tractor drawn and mounted implements. 4. Work in groups to provide feed, water and care for working oxen.
Assessment	1. Portfolio containing observation checklists showing that the student can train oxen, use ox-drawn implements and maintain the implements for all elements in learning outcome 1, 2 and 4. 2. Written or oral explanation of covering learning outcome 3

S2	Module 4. Measurement of fields and survey
Description	By the end of this module the learner should be able to measure fields and conduct field surveys and levelling correctly.
Learning Outcomes	1. Carry out measurement of angles, straight lines and irregular lines in the fields for field layouts correctly 2. Take accurate measurements of angles, heights and distances on the ground using survey tools and equipment 3. Produce contour maps using triangulations for soil and water conservation
Elements	**Map Layouts:** map drawing skills from survey measurements **Measurements:** notes, figures **Survey tools:** plumb bob, ranging rod, quickset/ theodolite, tripod stand, lining pegs, tape measures, arrows, 20 metre long strings, Gunther's measuring chains, levelling staff/measuring staff, note book, and plane survey table
Learning Strategies	1. Work individually to use survey tools and implements to measure angles, straight lines and irregular lines in the fields for field layouts correctly 2. Work individually when using survey tools and equipment to take accurate measurement s of heights and distances on the ground. 3. Work in groups by using triangulations to produce contour maps.
Assessment	1. Portfolio containing product checklists showing that the student can use survey tools to measure angles, heights and lengths and use the figures for levelling in survey methods to produce contour maps covering all elements in learning outcomes 1 to 3.

S3	Module 1. Irrigation, drainage and farm water supply and pollution
Description	By the end of this module the learner should understand irrigation, its importance and methods, describe drainage, its importance, causes and methods, explain water pollution, its causes and effects and explain control and preventive measures of water pollution
Learning Outcomes	1. Outline the importance of irrigation and drainage 2. Describe different methods of irrigation 3. Describe different methods of drainage 4. Describe problems associated with irrigation and drainage 5. Outline what is meant by a water works facility 6. Install and maintain various types of pipes for irrigation and drainage 7. Install and maintain various types of fittings for water harvesting and storage
Elements	**Methods of irrigation:** surface irrigation (basin, flood, furrow, and border, ring check, rectangular check basin, contour check basin), sub surface and drip/ trickle, overhead **Methods of drainage:** surface, cambered bed, sub surface, pumping, plating deep rooted crops, mole drains, French drains, Porous pipe drains **Problems:** water pollution, use of non-chemical method of pests and disease control, planting trees along the river bank, protection of water sources **Water works facility:** water treatment, purification works
Learning Strategies	1. Students should research on - the importance of irrigation and drainage - different methods of irrigation - different methods of drainage - problems associated with irrigation and drainage - what is meant by water works facility 2. Students should observe demonstrations and practice the use of workshop tools to install and maintain various types of pipes for irrigation and drainage. 3. Students should observe demonstrations and practice the use of appropriate workshop tools install and maintain various types of fittings for water harvesting and storage.
Assessment	1. Written or oral explanation of learning outcome 1 to 5 2. Portfolio containing observation checklists showing that the student can use workshop tools to install and maintain and repair irrigation, drainage and water supply facilities covering all elements in outcomes 6 and 7.

S3	Module 2. Soil and Water Conservation
Description	By the end of this module the learner should understand why soil and water should be conserved, the process of soil erosion and the various methods used in soil and water conservation
Learning Outcomes	1. Explore and classify the different types, causes agents, effects of soil erosion 2. Understand methods of soil and water conservation 3. Devise ways of water conservation
Elements	**Soil erosion:** Geological /normal/natural erosion, Accelerated erosion, wind erosion and water erosion (rill erosion, sheet erosion, gully erosion, Raindrop/ splash erosion, sub surface flow **Methods of soil and water conservation:** Mechanical methods of control like filter trips, grass strips, terraces (bench terraces, broad vased terraces i.e. magnum and Nichol's, narrow based terrace, fanya Juu and fanya chini terraces and absorption terraces and banks), bunds, cut off drains, diversion water ways, grassed water ways, use of agronomic measure like mulching, forest/afforestation, trash/stone line, gabion/porous dams, Soil management methods of control like ridging and, contour farming
Learning Strategies	1. Work in groups to research and investigate on different types, causes agents and effects of soil erosion for learning outcomes 1. 2. Students should observe demonstrations and practice to use appropriate garden tools and equipment to construct soil and water conservation structures for learning outcomes 2 and 3.
Assessment	1. Written or oral explanation of learning outcome 1 and 2 2. Portfolio containing observation and product checklists showing that the student can demonstrate the skills in using garden tools and equipment to construct water conservation structures

S4	Module 1. Farm structure and layout
Description	By the end of this module the learner should understand different forms of farm structures, and be able to construct fences, construct gates, treat materials for farm structures, construct farm buildings, maintain farm structures , ,construct animal handling layouts, understand the construction and use of green houses.
Learning Outcomes	1. Identify materials for construction of farm structures 2. Construct various types of fences 3. Construct various types of farm gates 4. Construct recommended farm buildings according to specifications using appropriate building materials 5. Construct animal handling layouts 6. Construct greenhouse structures 7. Treat materials for farm structures 8. Maintain farm structures using good practices
Elements	**Construction materials:** stones and masonry, aggregate, concrete, cement, thatch, timber (Wood), fabric board ceiling, mortar, glass, plastics, metals (metal pipes, metal bars, corrugated iron sheets, tiles, mud and wattle, reinforcing concrete and bamboos Fences: post and wire (barbed wire, plain wire, woven wire, chain link wire, razor sharp wire, chicken wire), stone wall, post and wooden rail **Farm gates: stile, cattle grid, styles, V-shaped man pass/walk through, head gate** **Farm buildings:** Foundation, wall, windows, doors, roof (gable, arched, flat, cone ,of diff) of food store , processing equipment building, crop store, equipment store, ,building, food store, calf shed, cyprus bins, milking shed/parlour, rabbit hutch, fish pond, poultry houses, **Building materials:** concrete blocks, bricks (hollow bricks, facing bricks, vent bricks, reinforcement iron bars (not twisted, plain, round bar, deformed bar/ contorted bar), mud/earth blocks and baked/burnt bricks **Animal handling layouts:** crushes (3 post and continuous), dips and spray races **Greenhouse structures:** construction materials, types of structures and use of structures **Treat materials:** seasoning timber (natural seasoning i.e air and water, artificial seasoning i.e. kiln and smoke, preservative paints, sap displacement, pourng the preservative, pressure method, hot and cold method **Maintain:** crush, cattle dips, maize cribs, stores, spray race, silos, calf pens, poultry houses, piggery unit, fish pond, fences and farm gates, rabbit hutches, milking parlour
Learning Strategies	1. Research on various materials required for construction of farm structures by using text books and internet. 2. Students should observe demonstrations and practice - how to build a fence using various materials - use of appropriate carpentry and masonry tools to construct various types of farm gates - use of appropriate carpentry and masonry tools and building materials to construct recommended farm buildings - use of appropriate carpentry and masonry tools and building materials to construct various animal handling layouts - use of appropriate carpentry and masonry tools and building materials to construct a greenhouse structures. - how to treat materials for farm structures - use of farm carpentry and masonry tools and building materials to maintain farm structures
Assessment	1. Portfolio containing observation and product checklists showing that the student can work in groups to identify 6 building materials, construct two (2) types of fences, construct two (2) farm gates, two (2) animal handling structures and two (2) farm buildings by using carpentry ,plumbing and masonry tools and equipment covering all elements in learning outcomes 1 to 8.

S4	Module 2. Farm Power
Description	By the end of this module the learner should understand different forms of farm structures, and be able to construct fences, construct gates, treat materials for farm structures, construct farm buildings, maintain farm structures , ,construct animal handling layouts, understand the construction and use of green houses.
Learning Outcomes	1. Understand the sources of farm power used in agriculture 2. Outline the advantages and disadvantages of sources of farm power 3. Put into correct use farm power sources for agricultural production activities
Elements	**Sources of farm power:** hand/human power, animal power, wind power e.g. windmill, storage battery/accumulator,, electric power, solar energy, electric power, engine power, fossil fuel, geothermal power, biomass, biomass e.g. biogas, nuclear power
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - describe the 5 sources of farm power for learning outcome 1. - explain 4 advantages and 4 disadvantages of 4 sources of farm power in learning outcome 2. 2. Students should observe demonstrations and practice the use six (6) sources of farm power in learning outcome 3.
Assessment	1. Presentation showing that the student understands five (5) sources of farm power including their advantages and disadvantages for all elements in learning outcome 1and 2. 2. Portfolio containing product checklists showing that the student can work in groups to put into correct use six (6) sources of farm power for all elements in learning outcome 3

S4	Module 3. Agricultural mechanization
Description	By the end of this module the learner should understand the importance of mechanisation, problems hindering mechanization in South Sudan, suggest possible solutions or remedies to those problems and describe those factors that aid mechanisation.
Learning Outcomes	1. Appreciate the importance of agricultural mechanisation 2. Understand the problems hindering mechanization in South Sudan 3. Suggest possible solutions or remedies to those problems in South Sudan 4. Describe those factors that aid mechanisation in South Sudan
Elements	**Importance of agricultural mechanization:** yield bigger harvest, timely nursery and field operations like planting, weeding and harvesting of crops of agricultural importance, relieves the farmer from drudgery and save time, it requires less labour, it saves money, it enables better quality products to be produced **Problems hindering mechanization:** economic, cultural, attitude, inadequate capital, farmers conservativeness to new farming methods (modern farming), inadequacy of technical know how to operate the machines, land fragmentation, topography, inadequate qualified staff and inadequate spare parts **Solutions:** education and training of farmers and the education of society, provision of efficient soft loan systems to farmers, sensitization of farmers, training of more technicians, land reforms by consolidation, registration, settlement and resettlement **Factors that aid mechanization:** proximity to mechanical workshop, economic prosperity in the country, prevalence of skilled operators and mechanics, land consolidation, desire for mechanisation
Learning Strategies	1. Work in groups to discuss importance of agricultural mechanisation. 2. Research on problems hindering mechanization in South Sudan by using internet, text books and interviews. 3. Research on possible solutions to problems hindering mechanisation in South Sudan by using internet, text books and interviews. 4. Work in groups to discuss factors that aid mechanisation in South Sudan.
Assessment	1. Written or oral explanation of covering learning outcome 1 to 4

Agricultural Extension & Research

S4	Module 1: Rural Sociology
Description	By the end of this module the learners should understand the impact of government agricultural training works on the attitudes and behaviours in rural farming societies.
Learning Outcomes	1. Understand traditional attitudes and behaviours in rural farming societies 2. Evaluate the impact of agricultural extension work in the society 3. Suggest possible solutions to farmers on resistant attitudes and behaviours
Elements	**Societies:** Rural society; culture, organisation, diffusion process, human behaviours and mind set **Evaluation:** Performance appraisal and research on the impact of agricultural extension **Solutions:** Learners suggest their solutions based on what they have evaluated in the society
Learning Strategies	Group discussions/debate covering traditional attitudes and behaviours in rural farming societies as per elements for learning outcome 1. 2. Group research on performance appraisal and research on the impact of agricultural extension as per elements for learning outcome 2. 3. In working teams students discuss suggestion and their solutions based on what they have evaluated in the society as per elements per learning outcome 3.
Assessment	1. Research report and oral presentation covering outcomes 1 to 3

S4	Module 2: Agriculture Extension
Description	By the end of this module the learners should be able to use agricultural extension as a tool to help farmers help themselves and describe communication methods in agricultural extension.
Learning Outcomes	1. Use agricultural extension teaching methods to help farmers help themselves 2. Describe how to communicate with agricultural extension methods
Elements	**Agricultural extension teaching methods:** radio, television, newspapers, bulletin and leaflets, circular letters, posters, cinema vans, public address systems, meetings, lectures, discussions and panels, tours and field days, agricultural shows, method demonstration, result demonstration, farm and home visits, letters. projects, telephones, farm supervision, conference **Communication in agricultural extension:** Understand how communications work through diffusion and adoption of new practices and ideas from research station
Learning Strategies	Students should find examples of agricultural teaching methods covering all elements per learning outcome 1. 2. Students should devise a programme to communicate to farmers to help them help themselves
Assessment	A portfolio of evidence containing 2 examples of agricultural extension training programme proposal including a description of how to communicate effectively with farmers

S4	Module 3: Agricultural Research and Education
Description	By the end of this module the learners should be able to use agricultural research findings for advice to farmers
Learning Outcomes	1. Apply correct methods of agricultural research for adoption by farmers 2. Apply correct methods and types of agricultural education to farmers for acquisition
Elements	**Agricultural research:** experimental designs and subjects, ANOVA, demonstration plots **Agricultural education:** list and prospectus of agricultural institutions in the country
Learning Strategies	1. Learners explain in class room and discuss and present on agricultural research and education per all elements covering learning outcome 1. 2. In group work students discuss and present on agricultural research and education as per elements covering learning outcome 2.
Assessment	1. Portfolio showing the application of correct methods of agricultural research and types of agricultural education in the school demonstration farm for learning outcome 1 and 2

S4	Module 4: Agriculture Shows and Exhibitions
Description	By the end of this module the learners should understand the importance of agricultural shows to farm development
Learning Outcomes	1. Plan and organise an agriculture show for farmers 2. Display materials for agricultural show for farmers to appreciate 3. Evaluate an agricultural show and give marks and rewards to participants
Elements	**Plan:** organisation of agricultural shows i.e. group and individual plans **Materials:** livestock and livestock products, crops, farm tools and machinery. **Evaluate:** criteria for awarding mark sheets and reward to participants
Learning Strategies	Students discuss, explain and present: • Planning and organizing an agricultural show and exhibition per all elements per learning outcome 1. • Materials for agricultural show and exhibition as per elements per learning outcome 2. 3. In group work students evaluate an agricultural show and give feedback to participants as per elements per learning outcome 3.
Assessment	1. Portfolio evidence showing the planning and organisation of 1 aspect of an integrated agricultural show made by the class or school including details of material displayed and analysis of evaluations made

Agro-Forestry

S4	Module 1: Importance of Agro Forestry in South Sudan
Description	By the end of this module the learners should understand the importance of agro-forestry in South Sudan.
Learning Outcomes	1. Define agro-forestry 2. Describe the importance of agro-forestry for production and soil / water conservation in South Sudan
Elements	**Agro Forestry:** crops, pastures, trees & land **Importance:** timber, fuel, soil fertility, environmental conservation, water catchments, aesthetic value, forests conservation
Learning Strategies	1. Working in groups using a range of sources to find out the processes / outputs of agro-forestry, and its importance in relation to production, soil and water conservation in South Sudan.
Assessment	1. Research report and oral presentation covering all elements for learning outcomes 1 and 2

S4	Module 2: Forms of Agro Forestry
Description	By the end of this module the learners should understand the various forms of agro-forestry in South Sudan and select appropriate trees for different & multi-purpose uses.
Learning Outcomes	1. Describe the forms of agro-forestry 2. Explain the uses of trees to human beings and the environment 3. Select appropriate trees for specific purpose(s)
Elements	**Forms:** wide row planting, intercropping, border planting, wood-lots **Uses:** soil conservation, control of soil erosion, maintenance of soil fertility and degradation, the effects of trees on soil properties and processes, the role of roots, modeling soil changes under agro-forestry trees and shrubs
Learning Strategies	1. Group work / assignment to explain the forms of agroforestry and its importance to both human beings and the environment giving two (2) examples of each of the two elements. 2. Tutor and students go to the field to identify and select suitable trees which have specific purposes (for both human beings and environment).
Assessment	1. Written or oral explanation of covering learning outcomes 1 to 3.

S4	Module 3: Forms of Agro Forestry
Description	By the end of this module the learners should understand the basic principles of agro-forestry and be able to apply the practices of agro-forestry for different purposes.
Learning Outcomes	1. Describe the principles of agro-forestry 2. Explain the good practices in agro-forestry 3. Apply agro-forestry practices in an integrated farm 4. Demonstrate the various methods of wood harvesting / preservation 5. Describe how wood can be efficiently used as fuel in the communities in South Sudan
Elements	**Principles:** soil erosion and sedimentation, physical processes and climatic erosivity, soil properties and erodibility, slope and landforms, splash erosion, erosion processes over a watershed, erosion measurement and evaluation, predicting the erosion potential, controlling upland erosion, erosion control in different land use systems, crop management and erosion control, conservation tillage, the effects of trees, forestry and agro-forestry on soil erosion, erosion hazards on steep slopes, the mechanism, measurement and control of wind erosion **Practices:** alley cropping, multi-storey cropping, woodlots **Demonstration:** site planning, nursery establishment, planting (trees, shrubs, methods, management, demo farm) **Harvesting methods:** pieces harvesting, forage harvesting
Learning Strategies	1. Group work / assignment to find out the principles of agroforestry, its recommended practices and ways of efficient utilization of wood as fuel across South Sudan. 2. Students should observe demonstrations and practice setting up an integrated farm in the school.
Assessment	1. Written or oral explanation covering learning outcomes 1 and 5. 2. Portfolio containing observation checklists showing performance evidence of the student's ability to apply agroforestry practices and demonstrate the various methods of wood harvesting / preservation

Animal Production

S1	Module 1: Principles of Animal Husbandry
Description	By the end of this unit Students will understand the importance of livestock and carry out simple management practice
Learning Outcomes	1. Know about importance of livestock in South Sudan 2. Understand uses of tools and equipments related to animal husbandry 3. Exercise animal handling methods and control 4. Perform basic methods of animal management
Elements	**Importance of livestock:** national economy, food security, income, social activities **Tools and equipment for poultry:** feeders, waterers /drinkers, laying nests, rooster/perches, hatchery, brooder, candler, leg crook **Tools and equipment for cattle, goats, sheep and pigs:** elastrator, burdizzo, syringes and needles ,thermometer, halter and rope, hoof trimmer, strip cup, trocar and canula, wool shear, ear notcher, bull ring and lead stick, bucket, bucket pump, milk churn, milk strainer/sieve, milking salve, weighing balance, hot iron, teeth clipper, drenching gun/dosing gun and bolus gun, dehorning wire, chaff cutter, nose ring, leading rod, ropes and halters, **Handling methods:** cattle (including casting methods e.g. rheuff's), sheep, goats, pigs, poultry, rabbits, fish, bees **Basic methods:** provision of feed and water, cleaning and disinfecting, milking, identification of sick animal, animal identification, dehorning, hoof trimming, castration, grooming.
Learning Strategies	1. Work in groups to discuss the importance of livestock in South Sudan. 2. Students should observe demonstrations of - the uses of tools and equipment related to animal husbandry and understand their functions - animal handling methods and practice handling methods and control
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing observation checklists showing that the student can use three (3) methods of handling livestock and perform animal management using all elements for learning outcome 3 and 4.

S1	Module 2: Livestock breeds in South Sudan
Description	By the end of this unit learners will be able to distinguish different types of livestock and different breeds and to match them to their uses.
Learning Outcomes	1. Understand different types of livestock and different breeds in South Sudan 2. Understand the uses of each type and breed and explain the reasons 3. Select appropriate types or breeds for specific production purpose
Elements	**Livestock types:** Cattle (draught cattle, dairy animals, beef cattle and dual purpose cattle), sheep (Wool sheep and meat types), goats (Mat goats and dairy goats), pig (Bacon) types, poultry (Types for eggs, types for meat/broilers, dual purpose types and hybrid poultry) **Breeds:** exotic, local **Uses:** milk, meat, egg, pet, animal power, research. **Appropriate types or breeds:** layer for egg production, broiler for meat, dairy animal for milk, animal for meat
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to - identify different types and breeds of livestock in South Sudan. - discuss of 3 types and 4 breeds of livestock in a session. - select appropriate types or breeds of livestock for specific production purposes (in school or field trips or excursions).
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3.

S1	Module 3: Anatomy and Physiology
Description	By the end of this unit learners will be able to identify different parts of animal body and understand their functions.
Learning Outcomes	1. Describe external parts of the animal body 2. Describe internal organs of animal body 3. Identify different parts and organs of the animal and explain their functions.
Elements	**External parts:** Cattle, sheep, goat, pig, poultry **Internal organs:** skeletal and muscles circulatory, digestive, respiratory, reproductive and urinary systems **Functions of parts:** function of each part and organs of the animal body **Functions of organs:** respiration, digestion, blood circulation
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - discuss and describe the external parts of the animal body - discuss and describe the internal parts of the animal body - identify different parts and organs of the animal and explain their functions.
Assessment	1. Written or oral explanations showing that the student can draw and mention external parts of five (5) different livestock, describe two (2) internal organs of two (2) systems of livestock and mention their functions for all elements in learning outcomes 1, 2 and 3.

S1	Module 4: Livestock Production Systems
Description	By the end of this unit learners will be able to explain the differences and understand the benefits and constraint of each system and choose the best one related to their environment.
Learning Outcomes	1. Describe different production system 2. Understand how these systems works 3. Apply the appropriate system for specific production goal
Elements	**Production system:** extensive, semi-intensive, intensive systems **How these systems works:** labour, cost, equipment, management **Appropriate system:** capital require, management skill, type of breeds
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - guide students to research on different livestock production system and write reports. - guide students to understand how livestock production systems work. 2. Students should observe demonstrations applying four (4) livestock production systems for specific production goals.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3. 2. Portfolio containing product checklists showing performance evidence of the student's ability to apply four (4) appropriate systems for specific production goals covering learning outcome 3 and all elements.

S2	Module 1: Animal Nutrition
Description	By the end of this unit learners will be able to understand animal feed nutrients and explain their function in the animal body and identify their sources.
Learning Outcomes	1. List different feed nutrients 2. Understand functions of each nutrient in the animal body 3. Identify the sources of feed nutrients
Elements	**Nutrients:** water, protein, carbohydrates, vitamin, fats, minerals. **Functions:** body building, immunity, energy, production, reproduction. **Sources:** plant, animal
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - Research and discussions of the different feed nutrients for livestock. - Discuss in groups to understand the functions of each nutrient in the animal's body. - Research and discuss sources of fee nutrients and calculate feed mixtures by using algebraic equations and Pearson's square methods.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3.

S2	Module 2: Beef Production
Description	By the end of this unit learners will be able to identify and fatten beef cattle.
Learning Outcomes	1. Describe beef breeds in South Sudan. 2. Understand process involve in fattening 3. Carryout management practices during fattening
Elements	**Beef breed:** local, exotic **Processes:** selection , de-worming , weighing machine, feeding, watering **Management:** housing, watering and feeding, weighing, de-worming, castration.
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - describe beef breeds in South Sudan. - discuss the process involved in fattening livestock. 2. Students should observe demonstrations showing management practices for fattening livestock.
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2 2. Portfolio containing observation checklists showing performance evidence of the student's ability to carry out management practices during fattening covering learning outcome 3 and all elements.

S2	Module 3: Dairy Production
Description	By the end of this unit learners will be able to carry out simple dairy management practices for higher quality and quantity milk production
Learning Outcomes	1. Describe characteristics of typical dairy breeds 2. Understand feeding dairy animal in different levels of production 3. Apply breeding practices 4. Take care of calves from calving to weaning 5. Demonstrate ability to produce and handle clean milk 6. Carry out management practices of dairy cattle
Elements	**Characteristics:** Body shape, udder, quantity of milk, adaptability, factors to consider before introduction and after introduction of exotic breeds of livestock **Feeding:** type of feeds, feeding methods. **Level of production:** Dry, pregnant, lactating cow and calves. **Breeding practices:** Cross breeding, inbreeding, line breeding, outcrossing, outbreeding, grading up/hybridization. **Care of calving cow:** reproductive system of the cow and the bull, sterility and fertility in livestock (Cryptorchidism, orchitis, free martin, ovarian disorders and nymphomaniac), heat detection, signs of heat, mating methods - natural and artificial mating i.e.in vivo and in vitro),sperm transport and capacitation, fertilisation, pregnancy and signs of pregnancy, pregnancy diagnosis, cloning, signs of pregnancy, preparation before, during and after calving. calving stages, difficulty in calving i.e dystocia, correction of breach delivery, care of the cow after calving. **Care of the calf from calving to weaning:** care of naval cord, taking the birth weight of the, calf housing feeding and watering calves, (bucket feeding and natural feeding),castrating, identification, removal of extra teats, deworming, vaccination, weaning, casting, handling at feeding, **Clean milk:** milk synthesis and secretion, hormones involved in milk let down and milk hold up, factors that affect quality and quantity of milk produced by a cow, quality of good milk, how to produce clean milk (milker, cow, utensil and milking place hygiene), procedure of milking, milking method used (stripping, full hand and machine), salient qualities of a good stock person (stockman/stock woman), care for milk after production (weight, strain, pasteurize, store in a milking can or refrigerator) **Management practices:** Housing, provision of feed and water, cleaning and disinfecting, record keeping
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - discuss and describe characteristics of a typical dairy breed of cow or goat. - discuss in order to understand feeding of dairy animals in different levels of production for maintenance, production and growth. 2. Students should observe demonstrations and practice - apply breeding practices. - taking care of the calving cow from signs of parturition to calving - taking care of the calf after calving. - using livestock production tools, equipment and structure to take care of calves from calving to weaning, - using dairy/livestock production tools in order to produce and handle clean milk. - using livestock production tools, equipment and inputs in order to manage dairy cattle - using correct tools and procedures to produce clean milk for all elements in learning outcomes 2 to 7.
Assessment	1. Written or oral explanations covering learning outcome 1. 2. Portfolio containing observation checklists showing performance evidence of the student's ability to feed animals, apply breeding practices, take care of the calving cow and calf, take care of the calf and manage it from birth to weaning covering all elements for learning outcomes 2 to 7.

S2	Module 4: Goat and Sheep Production
Description	By the end of this unit learners will be able to exercise goat and sheep breeding and management practices
Learning Outcomes	1. Describe different breeds of sheep and goat. 2. Explain breeding methods use for sheep and goats 3. Carry out management practises of sheep and goats
Elements	**Different breeds:** local breeds, dairy breed, meat breed. **Breeding methods:** natural mating , artificial mating **Management:** housing, provision of feed and water, cleaning and disinfecting, milking. castration, identification of sick animal. care for pregnant animal, care of kid and lamb
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - research and describe different breeds of sheep and goat. - explain the different breeding methods used for sheep and goats. 2. Students should observe demonstrations to carry out management practices of sheep and goats.
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence of the student's ability to carry out management practices for sheep and goats for all elements for learning outcomes 3.

S2	Module 5: Fishing and Fishing Gears
Description	By the end of this unit learners will be able to carry out fishing practice
Learning Outcomes	1. Identify Fishing gears 2. Understand sustainable fishing techniques 3. Carry out fish preservation
Elements	**Fishing gears:** net, hooks, boats, cooling boxes **Sustainable Fishing:** fish law and regulations of South Sudan **Technique:** fish camp, laying nets, hooks **Preservation:** handling, drying, salting, freezing
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - monitor/coach the students to identify fishing gears. - discuss and explain the use of sustainable fishing techniques. - discuss and describe construction of fish ponds 2. Students should observe demonstrations to fish carry out harvesting and preservation techniques.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3. 2. Portfolio containing observation checklists showing performance evidence of the student's ability to use sustainable fishing methods, harvesting and preservation techniques covering all elements for learning outcomes 2 and 4.

S3	Module 1: Hatchery and brooder management
Description	By the end of this unit learners will be able to produce and healthy chicks
Learning Outcomes	1. Distinguish parts of egg and their functions 2. Select good quality eggs for incubation 3. Describe different types of incubation 4. Manage incubation using various techniques 5. Understand brooding types and management 6. Carry out hatchery and brooder management
Elements	**Parts of egg:** shell, shell membrane, albumin, yolk **Quality egg:** checked by candling, egg shape, size of egg, free of cracks, clean **Type of incubation:** natural, artificial **Techniques:** frequent turning of eggs, temperature, humidity, incubator hygiene, sexing of chick **Brooding types:** natural, artificial **Brooding management:** light, temperature, space , feeding, watering, vaccination
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - distinguish parts of an egg and their functions - discuss how to select good quality eggs for incubation - describe different types of incubation - understand the different techniques to manage incubation - understand brooding types and management 2. Students should observe demonstrations and practice: - selecting good quality eggs for incubation - managing natural and artificial incubation techniques of eggs - managing brooding in poultry production - carrying out hatchery and brooder management practices
Assessment	1. Written or oral explanations covering learning outcomes 1, 3 and 5. 2. Portfolio containing observation checklists showing performance evidence of hatchery and brooder management covering all elements for learning outcomes 2, 4 and 6.

S3	Module 2: Egg Production
Description	By the end of this unit learners will understand production systems and manage layers
Learning Outcomes	1. Describe layers strains for production 2. Explain different production systems of layers 3. Carry out various management practices
Elements	**Breeds:** local, exotic **Systems:** free range, floor system, cage system **Management:** feeding, watering, cleaning, egg collection , de-beaking, record keeping, marketing
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: identify and describe layer strains for production be able to explain different production systems for layers 2. Students should observe demonstrations to: - carry out management practices
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence of management practices covering all elements in for learning outcome 3.

S3	Module 3: Broiler Production
Description	By the end of this unit learners will understand production systems and manage broilers for quality meat production
Learning Outcomes	1. Identify broiler breeds for production 2. Understand different production systems of raising broilers 3. Carry out various management practices
Elements	**Breeds:** local, exotic **Systems:** free range, floor system, cage **Management:** brooding, feeding, watering, clean, slaughtering, dressing, storage
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - discuss and describe broiler breeds for production - describe and explain production systems of raising broilers 2. Students should observe demonstrations to: - carry out management practices with broilers
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence of management practices for broilers covering all elements for learning outcomes 3.

S3	Module 4: Fish Farming
Description	By the end of this unit learners will be able to carry out fish farming practices
Learning Outcomes	1. Identify fish species suitable for fish farming 2. Understand pond environment 3. Understand different types of integrating fish culture 4. Carry out fish farm management practices
Elements	**Fish species:** Tilapia, catfish **Pond environment:** quality of water, pond cleaning, stocking rate **Integrating:** rice, pig, chicken, ducks, geese **Management:** fertilization of the pond, maintain water level, changing of water, feeding, harvesting, control of predators.
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - identify fish species suitable for fish farming. - describe fish pond construction and environment - discuss types of integrated fish culture 2. Students should observe demonstrations to: - carry out fish farm management, harvesting, processing, preservation and predator control practices
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3. 2. Portfolio containing observation checklists showing performance evidence of fish farm management, harvesting, processing, preservation and predator control practices covering all elements for learning outcomes 4.

S3	Module 5: Pig Production
Description	By the end of this unit learners will be able to exercise pig breeding and management practices
Learning Outcomes	1. Describe different breeds of pigs 2. Understand breeding management for pigs 3. Carry out management practices of pigs 4. Demonstrate piglet management
Elements	**Different breeds:** local, exotic **Breeding:** selection of breeding stock, management of breeding stock **Management:** housing, provision of feed and water, cleaning and disinfecting, identification of sick animal. health care **Piglet management:** feeding, castration, weaning, heath care
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - discuss and describe breeds of pigs. - discuss and describe breeding methods and management of pigs 2. Students should observe demonstrations to: - carry out management practices of pigs - carry out piglet management practices from farrowing to weaning
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence of management practices of pigs and demonstrate piglet management practices from birth to weaning covering all elements for learning outcomes 3 and 4.

S4	Module 1: Milk Processing
Description	By the end of this unit learners will be able to carry out different processing methods and produce high quality milk products
Learning Outcomes	1. Explain the importance of milk processing 2. Identify equipment for milk processing and preservation 3. Demonstrate milk processing techniques 4. Produce milk products of high quality
Elements	**Importance:** long shelf life, adding value **Equipment:** milking churn, cups, starter **Techniques:** pasteurization, cooling, fermentation, creaming, drying **Milk products:** cheese, yogurt, ice-cream, cream, sour cream, butter, Ghee, powder milk
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - explain the importance of milk processing 2. Students should observe demonstrations to: - identify and use equipment for milk processing and preservation - practice milk processing techniques - produce milk products of high quality
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence of demonstrating milk processing techniques and product checklists for the production of high quality milk covering all elements for learning outcomes 3 and 4

S4	Module 2: Meat Processing
Description	By the end of this unit learners will be able to carry out slaughtering and processing of meat in hygienic manner
Learning Outcomes	1. Know different tools uses for slaughtering 2. Understand factor that affect the quality of meat during slaughtering 3. Demonstrate the process of slaughtering animals in a hygienic manner 4. Carry out various type of meat processing
Elements	**Tools:** Tools for stunning (bolt captive pistol, hammer, gas, electric shock), sticking knifes, skinning knife, meat saws, meat hooks, meat chop, spreader, grinding stone and steel **Quality of meat:** stress, injuries, diseases **Hygiene:** clean environment, personal hygiene, slaughter house/slab hygiene, equipment hygiene **Processing:** hamburger, sausages
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - use different tools for slaughtering animals - discuss and explain the factors that affect the quality of meat during slaughtering. 2. Students should observe demonstrations to: - practice the process of slaughtering animals in a hygienic manner - practice and carry out meat processing techniques
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence that the student can use different tools for slaughtering livestock, demonstrate the process of slaughtering animals in a hygienic manner and product checklists to carry out meat processing techniques for all elements for learning outcomes 1, 3 and 4.

S4	Module 3: Hides and Skins
Description	By the end of this unit learners will be able to produce and preserve high quality hides and skin
Learning Outcomes	1. Describe the importance of hides and skin 2. Describe factors affecting quality of skin and hides 3. Explain the process of preservation and storage of hides and skins 4. Demonstrate hide and skin preservation techniques
Elements	**Importance:** income, adding value, clothing **Factors:** branding, scratches (thorns, horns and wires), wounds, ticks bites, poor flaying, bleeding, diseases **Preservation in slaughter house:** hide pulling machine, trimming, salting, and draining and palletizing **In warehouse:** initial inspection, removal of excess salt, weighing and grading, palletizing, final weighing and labeling **Preservation techniques:** sun drying, salting
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - describe the importance of hides and skins - discuss and explain factors affecting quality of hides and skins 2. Students should observe demonstrations to: - practice the processes of processing, preservation and storage of hides and skins.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3. 2. Portfolio containing product checklists showing performance evidence that the student can demonstrate the techniques of preservation of hides and skins for all elements for learning outcome 4

S4	Module 4: Feed Production and Preservation
Description	By the end of this unit learners will be able to carry out feed and pasture preservation and storage
Learning Outcomes	1. Describe types and nutritive value of pasture in South Sudan 2. Understand the factors affecting palatability and nutritive value of pasture 3. Carry out hay and silage making
Elements	**Types:** grasses, legumes, - shrubs, agricultural by-products **Value:** proteins, energy, minerals, vitamins **Factors:** type of plant, age, season, type of soil **Hay making:** harvesting, drying, baling, storage **Silage making:** types of silo, harvesting, wilting, chopping, compacting
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - discuss and describe classification, types and nutritive value of pasture in South Sudan - discuss and understand the factors affecting palatability and nutritive value of pasture 2. Students should observe demonstrations to: - carry out hay and silage making
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing product checklists showing performance evidence that the student can carry out hay and silage making covering all elements for learning outcomes 3.

S4	Module 5: Animal Health
Description	By the end of this unit learners will be able to apply preventive measures, diagnose, and administer treatment
Learning Outcomes	1. Know common diseases of livestock and their symptoms 2. Describe modes of transmissions for each disease 3. Apply the process of preventive and disease control measures 4. Carry out drug administration
Elements	**Common diseases of:** cattle, sheep, goats, poultry, pig, rabbits **Mode of transmission:** airborne, waterborne, soil, victor and contact, secretion, rodents and birds **Prevention and disease control:** isolation, quarantine, hygiene, vaccination, culling, control of victors, de-worming, allowing minimum visitors **Drug administration:** oral, injection, dipping, spraying, inhalation, topical, rectal, vaginal
Learning Strategies	1. Classroom interaction by tutor and students, brainstorm, working in groups to: - discuss common diseases and parasites of livestock and their symptoms - discuss and describe modes of transmissions for each livestock disease or parasite 2. Students should observe demonstrations to: - apply the processes of preventive livestock disease and parasite control - carry out drug administration to livestock
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation checklists showing performance evidence that the student can apply the processes of preventive livestock disease and parasite control and carry out drug administration to livestock for all elements for learning outcomes 3 and 4

Bee Keeping

S3	Module 1: Introduction to Bee Keeping
Description	By the end of this module the learners will understand the importance of bee keeping, biology and ecology of bee colony, the types and parts of hives, learn skills in stocking of the bee hives and factors affecting the quality of honey
Learning Outcomes	1. Understand the key principles and importance of bee keeping (Apiary) 2. Understand the biology and ecology of bee colony 3. Understand the types and parts of hives and the equipment used in bee keeping 4. Stock a bee hive 5. Manage a bee hive (colony)
Elements	**Bee keeping (Apiary):** definition, basic principles, practices **Importance:** pollination, production of honey (including jelly and wax), high energy food, as a source of income, medicinal value (controlling worms such as platyhelminthes and nematodes), additive function in food preservation (sweetener) **Biology and ecology:** the Queen, drones, worker bees, life cycle, work of a bee **Types and parts of hives:** traditional hives, Top Bar (KTBH- Kenya Top Bar Hive introduced in Kagelu Forestry Training Center) **Equipment:** protective gears, honey containers, hive tool **Stocking:** act of attracting bees to an empty hive by (1) using swarm net (2) catcher box (3) bee louse, or honey badgers **Manage:** population, food reserves, organization, swarming of bees, handling boxes
Learning Strategies	1. Students should work in groups to research and investigate the principles and practices of bee keeping 2. Students should compile a report from their research 3. Students should practice using and be able to describe the use of tools and equipment for bee keeping 4. Tutor should demonstrate how to build and manage a colony 5. Tutor should monitor/coach the students building and managing a colony in a group
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing observation checklists showing that the student can demonstrate the skills in stocking a beehive and managing two (2) colonies for all elements in learning outcomes 4 & 5.

S3	Module 2: Honey Processing and Value Addition
Description	By the end of this module the learners will be able to understand honey & wax processing methods and add value to the products
Learning Outcomes	1. Explain wax processing methods 2. State factors affecting the quality of honey 3. Demonstrate value-addition in bee keeping
Elements	**Methods:** heat method, crushing and straining method, centrifugal extractor **Wax processing:** heating, straining (through a muslin cloth), cooling overnight, draining water, remove mixtures, re-melting, packaging **Quality of honey:** type of plants, nectar, time of harvesting, method of harvesting, method of processing **Value-addition:** harvesting, processing, processing, packaging and marketing
Learning Strategies	1. Students should work in teams to examine, assess and use a range of wax processing methods for learning outcome 1 2. Students should review and study the important factors affecting the quality of honey for learning outcomes 2 3. Students should work in teams to discuss/demonstrate the various elements of value-addition in bee keeping for learning outcome 3
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3.

Crop Production

S1	Module 1: Principles of Crop Production
Description	By the end of this module the learners should understand the factors influencing agriculture correctly
Learning Outcomes	1. Identify factors influencing agriculture 2. Know the role of factors influencing agriculture
Elements	**Factors:** Human factors (level of education and technology, health, economic conditions, cultural and religious beliefs), Biotic factors (living organisms such as pests, parasites, decomposers, pathogens, predators, pollinators, nitrogen fixing bacteria), Climatic factors (rain fall, temperature, wind, relative humidity and light), Edaphic or soil factors: (definition of soil, soil formation. physical agents of weathering, biological agents of weathering, chemical weathering)
Learning Strategies	Classroom interaction by tutor and students, brainstorm, working in groups to: - identify factors influencing agriculture - roles of factors influencing crop production - the history and definition of branches of agriculture
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2

S1	Module 2: Importance of Land Preparation
Description	By the end of this module the learners should be able to carry out land preparation in the field
Learning Outcomes	1. Know the importance of land preparation 2. Outline land clearance methods 3. Describe primary cultivation methods 4. Identify farm tools and equipments use in different stages of land operations 5. Identify sub soiling and minimum tillage in the field 6. Demonstrate preparation stages until land is ready for planting
Elements	**Land clearance:** tree felling, burning, slashing, use of chemicals **Primary cultivation:** importance, hand digging, mechanical cultivation, use of an ox, secondary tillage, tertiary operation (ridging, rolling, leveling) **Tools:** Jembe or fork, Ox-plough, tractor and local hoes. Stages: primary cultivation: (hand digging, mechanical cultivation, ox-plough), secondary tillage (harrowing, to remove weeds, to break the soil clods in to fine particles, to level field to achieve uniform level, to incorporate organic matter in to soil for decomposition), tertiary operation (ridging, rolling, leveling, sub soiling, minimum tillage) **Sub soiling, minimal tillage:** reduce costs of cultivation, control soil erosion, maintain soil structure, conserve moisture, prevent disturbance of roots, prevent exposure of humus to sun's rays
Learning Strategies	1. Work in groups to discuss, identify and present about: - The importance of land preparation as per learning outcome 1. - Land clearance methods as per all elements per learning outcome 2. - Primary cultivation methods as per all elements per learning outcome 3 - Farm tools and equipment and their uses in different stages of land operations as per all elements per learning outcome 4 2. Students should observe demonstrations and practice sub soiling and minimum tillage in the field covering all elements per learning outcome 5 and land preparation stages until planting covering all elements per learning outcome 6.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 5. 2. Portfolio containing observation checklists showing that the student can demonstrate the preparation stages until land is ready for planting using appropriate tools covering learning outcome 6

S1	Module 3: Farming (Arable Farming)
Description	By the end of this module the learners should be able to carry out Crop Farming in the field
Learning Outcomes	1. Describe crop farming types in fields 2. Understand characteristics of farming systems in the fields 3. Practice crop farming system in the fields
Elements	**Crop Framing types:** Field crops (perennial crops - coffee, tea, cane, sisal, annual crops – cereal, pulses), horticultural crops: (Floriculture growing of flowers, Olericulture growing of vegetable, Pomology growing of fruits), livestock farming (pastoralism, fish rearing, bee keeping, poultry keeping) **Characteristics of farming systems:** extensive farming require large tract of land, low capital investment an low output, low labour, intensive farming requires high capital, high labour and high yield, large scale farming requires large tract of land, heavy capital, skill labour and high level management., plantation is a large scale farming characterize by one production of one crop.
Learning Strategies	1. Working in groups students describe and present on crop farming types and the characteristics of farming systems in the fields 2. Students should observe demonstrations and practice crop farming systems in fields.
Assessment	1. Written or oral explanations covering learning outcome 1 and 2. 2. Portfolio containing observation checklists showing that the student can practice two (2) types of crop farming system in the fields for learning outcome 3.

S1	Module 4: Methods of Farming
Description	By the end of this module the learners should be able to carry out farming systems in the field.
Learning Outcomes	1. Describe farming systems in fields 2. Outline the advantages and disadvantages of shifting cultivation 3. Describe the importance of farming systems
Elements	**Farming Systems:** mix farming, nomadic pastoralism, shifting cultivation, organic farming, agro forestry **Advantages:** low capital requirement, no pest and disease build up, soil is maintained **Disadvantages:** low yield, waste of time, no incentives, not applicable in density areas
Learning Strategies	1. Classroom interaction by the tutor and students on the importance of farming methods and their advantages including disadvantages as per elements for learning outcome 1, 2 and 3.
Assessment	1. Written or oral explanations covering learning outcome 1 and 2.

S1	Module 5: Farming Systems
Description	By the end of this module the learners should be able to carry out farming system in the field.
Learning Outcomes	1. Illustrate importance of crop farming systems 2. Identify farming systems in the Republic of South Sudan 3. Investigate farming systems in fields
Elements	**Systems:** Extensive system, Intensive system, Ranching
Learning Strategies	1. Classroom interaction by the tutor and students on the importance of crop farming systems and their use in South Sudan. 2. In groups students should research farming systems used world wide gathering suitable examples
Assessment	1. Oral presentation covering all elements for learning outcomes 1 to 3.

S1	Module 6: Role of agriculture in the development of the Republic of South Sudan
Description	By the end of this module the learners should understand the role of agriculture in the development of the Republic of South Sudan.
Learning Outcomes	1. Illustrate the importance of agriculture in the Republic of South Sudan
Elements	**Importance of agriculture:** food supply, source of employments, provision of foreign exports, source of Raw Material, source of Money or Capital.
Learning Strategies	Classroom interaction by the tutor and students on the role of agriculture in the development of the Republic of South Sudan.
Assessment	1. Written or oral explanations covering learning outcome 1.

S1	Module 7: Farm Tools and Equipment
Description	By the end of this module the learners should be able to identify use and repair farm tools.
Learning Outcomes	1. Identify and use farm tools and equipment 2. State importance of farm tools and equipment 3. Categorize farm tools and equipment 4. Repair and maintain tools.
Elements	**Tools and equipment:** panga, machete, axe, shovel, slasher, jembe, fork jembe, pick axe, spade, sickle, garden fork, pruning saw, rake, pruning shears, secatures, dibber, garden lines, garden trowel, wheel barrow, pruning knife, watering can, measuring tape, knapasack sprayer, leveling board, pruning hook **Importance:** make work easier, more efficient **Repair and Maintain:** cleaning after use, cutting edges sharpening, replace broken handles, moving parts oiling, store under shade
Learning Strategies	1. Working in groups to identify and categorize a range of farm tools / equipment and their uses including their importance 2. Working in teams students demonstrate the correct care and maintenance of tools/equipment and suggesting solution(s) for better handling.
Assessment	1. Written examination covering learning outcomes 1 to 3. 2. Portfolio containing observation checklists showing that the student can repair and main ten (10) tools for learning outcome 3 covering all elements.

S2	Module 2: Planting
Description	By the end of this module the learners should be able to carry out different planting methods in the fields
Learning Outcomes	1. Identify different types of planting material in the fields 2. Determine the selection of planting materials for planting 3. Practice preparation of planting materials in the field 4. Understand time of planting and plant population 5. Carry out methods of planting
Elements	**Types of planting material:** seeds, vegetative materials **Preparation:** breaking seed dormancy, seed dressing, seed inoculation, chitting **Plant population:** type of machinery to use, soil fertility, size of plant, moisture availability, use of the crop, pest and disease control, habit of crop, seed rate (factors considered in choosing seed rate), depth of planting (soil type, soil moisture content, size of seed, type of germination) **Methods of planting:** broadcasting, row planting
Learning Strategies	1. Working in groups the students should plan for planting by: - Identify suitable types of planting material in the fields - Select of different types of planting material - Find out how to prepare planting materials - Determine time of planting and plant population - Describe how to carry out methods of planting 2. Students should observe demonstrations and practice planting methods in the school demonstration farm
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to carry out methods of planting covering all elements for learning outcome 5.

S2	Module 3: Crop Rotation
Description	By the end of this module the learners should understand the importance of crop rotation and demonstrate crop rotation in the fields
Learning Outcomes	1. Describe the importance of crop rotation in the fields 2. Describe factors influencing crop rotation 3. Outline types of mulching materials 4. Describe the advantages and disadvantages of mulching 5. Understand rotation programmes for crop rotation 6. Carry out routine field practices in the field 7. Apply terms used in crop production
Elements	**Crop rotation:** mono cropping, intercropping, mixed cropping, mulching **Factors:** crop root depth, crop nutrient requirements, weed control, pests and diseases, soil fertility, soil structure **Mulching materials:** organic, inorganic **Advantages:** prevents water evaporation, acts as an insulator, control soil erosion, control weeds, improve soil structure, improve soil fertility **Disadvantages:** provides a breeding ground for pests, traps the light, showers of rain fall, fire risk, expensive **Field practices:** thinning, gapping, roguing, pruning **Rotation Programmes:** three course rotation, four course rotation **Crop production:** mono cropping, intercropping, mixed cropping, mulching
Learning Strategies	1. Working in group students discuss and present on : - Importance of crop rotation in the fields. - Factors influencing crop rotation. - Types of mulching materials - Outline types of mulching materials. - Advantages and disadvantages of mulching - Routine field practices in the field 2. Students should observe demonstrations and practice crop rotation and carry out routine field practices methods in the school demonstration farm.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 5. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to carry out routine filed practices and crop production covering all elements for learning outcome 6 and 7.

S2	Module 4: Field Crops
Description	By the end of this module the learners should be able to select and plant various fields crop in the fields
Learning Outcomes	1. Describe various field crops in the fields 2. Classify various field crops 3. Know the importance of planting field crops for crop yield 4. Practice planting field crop in the fields
Elements	**Field crops:** sorghum, maize, finger millet, bulrush millet, rice, sesame, barley **Classify:** fibrous, cereal, oil **Planting:** ecological requirements, varieties, selection and preparation of planting materials, land preparation, field operations, pest and disease control, harvesting, storage, marketing
Learning Strategies	1. In working group the students should:- - describe the various field crops - classify various field crops - explain the importance of field crops for crop yield 2. Students should observe demonstrations and practice planting field crops in the school demonstration farm.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing product checklists showing performance evidence of the student's ability to plant two (2) field crops covering all elements for learning outcome 6 and 7.

S3	Module 1: Forage Crops
Description	By the end of this module the learners should be able to manage forage crops in the fields.
Learning Outcomes	1. Define the meaning of forage and pasture in the fields 2. Classify pastures in the field 3. Understand pasture establishment and management in the field 4. Understand the importance of utilisation of forage crops for fattening farm animals 5. List grazing systems and advantages and disadvantages of each 6. Demonstrate the production of forage crops
Elements	**Forage:** pasture, pasture classification, pasture establishment, management of pasture, pasture utilization, grazing systems, folder crops **Classify pastures:** pure stand or mixed pastures, natural, artificial, high, medium, low altitude **Pasture establishment:** prepare land, plough, harrow, level seed bed, rolling, planting, use certified seeds, broad cast, apply organic or phosphate fertilizers, appropriate depth **Management:** weed control, topping, to dressing, fencing, irrigation, pests **Utilisation:** first grazing 4-6 weeks after planting, subsequent grazing 4-8 week interval, correct stocking rate, rotational grazing or sero grazing **Grazing systems:** rotational grazing (pad docking, strip grazing, tethering), continuous grazing (herding), zero grazing (stall feeding) **Advantages:** quick accommodation of manure, animals use feed without wastage, animals produce high yield, control diseases and parasites is easy, it requires little land, it allows higher stocking rate **Disadvantages:** high initial capital is required, high management and skills are needed, need a lot of labour, diseases can be easily spread
Learning Strategies	1. Working in groups the students should:- - Define the meaning of forage and pasture in the fields - Classify pastures in the field - Understand pasture establishments and management - Outline the importance of utilisation of forage crops for fattening farm animals - List grazing systems and advantages and disadvantages of each 2. Students should observe demonstrations and practice as a team the production of forage crops
Assessment	1. Written or oral explanations covering learning outcomes 1 to 5. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to produce one (1) type of forage crop for learning outcome 6.

S3	Module 2: Fodder Crops
Description	By the end of this module the learners should be able to manage fodder crops in the fields.
Learning Outcomes	1. Describe various fodder crops in the fields 2. Understand the production of fodder crops 3. Classify various fodder crops into their plant groups 4. Demonstrate the production of fodder crops
Elements	**Fodder Crops:** napier crass, guatemala, sorghum, kales, edible canna, marigolds, sugar beets, Kenyan white clover, lucerne, desmodium, finger millet, bulrush millet, sesame, barley, agro forestry trees, bushes used as fodder crops **Production:** ecological requirements, establishment, management, utilisation, production per area **Classify:** fibrous crops cereal, (grassy crops), leguminous crops
Learning Strategies	1. Working in groups students should:- - Describe the various fodder crops - Understand how to produce fodder crops - Classify various fodder crops into their plant groups 2. Students should observe demonstrations and practice as a team the production of fodder crops
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to produce one (1) type of fodder crop for learning outcome 4.

S3	Module 3: Weeds and Weed Control
Description	By the end of this module the learners should be able to identify and control weeds in the fields
Learning Outcomes	1. Describe various weeds in the fields 2. Classify weeds in the fields 3. Describe weed control methods 4. Understand the harmful effects and benefits of weeds for crop yield 5. Practice weed control in the fields
Elements	**Classify:** growth cycle, plant morphology, competitive ability, harmful effects **Weed control methods:** chemical, mechanical, cultural, biological, legislative **Harmful effects:** weed compete with crops for nutrients, some weeds are parasitic to cultivated crops, some weeds lower quality of agricultural produce, some weeds are poisonous, to man and livestock, some weeds act as alternate host for insects, some weeds allelopathic, some weeds block irrigation channels, aquatic weeds block navigation and deprive fish and other living organisms from oxygen, weeds lower quality of pasture, some weeds are difficult to handle and control. **Benefits of Weeds:** some weed are edible, some weeds have medicinal effects, weeds act as soil cover ,weeds add organic matter to the soil, leguminous weed fix nitrogen in the soil
Learning Strategies	1. Working in groups students should:- • List the various weeds • Classify weeds into their plant groups • Outline weeds control methods • Describe the harmful effects and benefits of weeds for crop yield 2. Students should observe demonstrations and practice weed control in the school demonstration farm
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to control weeds covering all elements for learning outcome 5.

S4	Module 1: Crop Pests and diseases
Description	By the end of this module the learners should be able to identify and practice application of chemical to control crop pests in the fields
Learning Outcomes	1. Identify various crop pests and diseases 2. Understand advantages and disadvantages of crop pests and diseases for crop yield 3. Classify crop pests and diseases in to their entomological groups in the fields. 4. Describe control methods of crop pests 5. Describe cultural methods of controlling crop pests 6. Describe biological methods of controlling crop pests 7. Classify types of pesticides 8. Describe factors affecting the efficiency of pesticides 9. Apply methods of pest control in fields
Elements	**Crop Pests:** insect pests with biting and chewing mouth parts (locusts, grass hoppers, crickets, maize stalk borer, army worms, cut worm bollworms, termites and various larval and adult stage of beetle, Insects with piercing and sucking mouth parts (aphids, scales, certain flies, adult stages butter flies and moths, cotton seed bugs, cotton leaf hopper, mealy bugs and thrips), Mites, nematodes, rodents ,birds (Sudan Dioch, the common weaver bird, moue bird, domestic fowl, large animal (include wild animals, domestic animals) **Classify:** mode of feeding ,crops attacked, stage development of pest, stage of growth of crop attacked, scientific classification, level of damage, the place where they are found or habitat **Control methods:** legislative method/quarantine, physical measures (use of lethal temperature, proper drying of produce, flooding, suffocation, physical destruction of pests, use of scarecrows, use of physical barriers, use of electromagnetic radiation. **Cultural methods:** Timely planting, timely harvesting , proper tillage, close season, trap cropping, crop rotation ,planting resistant crop varieties, field hygiene, alternation of environmental conditions, crop nutrition, destruction of alternative hosts, use of clean planting materials, proper spacing, use of organic matter, irrigation and chemical control. **Biological methods:** lady bird, wasps, praying mantis , majimoto ants, chickens, cats, chameleon **Classify types of pesticides:** formulation, target pest, mode of action **Factors affecting the efficiency of pesticides:** concentration, timing of application, weather conditions at the time of application, persistence **Storage pests:** include (rodents, insects and fungi)
Learning Strategies	1. In group discussions and presentations the students should: - Identify various crop pests. - Outline the advantages and disadvantages of crop pests for crop yield. - Classify crop pests in to their entomological groups in the fields. - Describe control methods of crop pests. - Outline the cultural and biological methods of controlling crop pests. - Classify types of pesticides. - List the factors affecting the efficiency of pesticides. - Practice application of pests control in the fields. 2. Students should observe demonstrations and practice pest control in the school demonstration farm
Assessment	1. Written or oral explanations covering learning outcomes 1 to 8. 2. Portfolio containing observation checklists showing performance evidence of the student's ability to control two (2) types of pests for learning outcome 9.

S4	Module 2: Crop Diseases
Description	By the end of this module the learners should be able to identify and practice application of chemical to control crop diseases in the fields
Learning Outcomes	1. Describe types of crop diseases 2. Describe the effects of crop diseases in the field 3. Describe methods of controlling crop diseases 4. Describe the advantages and disadvantages of controlling crop diseases 5. Practice application of disease control in the fields
Elements	**Crop diseases:** common fungal diseases (late blight, rusts, smuts. coffee berry disease), bacterial disease (bacterial blight of coffee,), nutritional disorder: crops do not get enough nutrients deficiency symptoms include(yellowing, drying , falling, of leaves stunted growth and death in extreme conditions) **Effects:** lower crop yields, production of poor quality products, cause food poisoning, nutritional disorders (yellowing, drying, falling of leaves, stunted growth, death in extreme conditions) **Controlling crop diseases:** chemical application, mechanical application **Advantages:** faster, predictable results **Disadvantages:** expensive, non-selective, insects develop resistance, toxic to man, livestock and other animals, use requires skills and care.
Learning Strategies	1. In group work the students should;- - Identify various crop diseases. - Outline the advantages and disadvantages of crop diseases for crop yield. - Classify crop diseases in to their entomological groups in the fields. - Describe control methods of crop diseases. - Describe cultural and biological methods of controlling crop diseases. - Classify types of pesticides. - Describe factors affecting the efficiency of pesticides. - Practice application of diseases control in the fields. 2. Students should observe demonstrations and practice the application of disease control in the school demonstration farm.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing observation checklists showing performance evidence of the student's ability to apply two (2) types disease control for learning outcome 5.

S4	Module 3: Crop Improvement
Description	By the end of this module the learners should be able to plant crops to increase yields
Learning Outcomes	1. Understand the importance crop improvement in order to obtain better and improved varieties which is suit able for every condition 2. Describe reasons for crop improvement to improve crops varieties 3. Outline the advantages and disadvantages of the pedigree method 4. Outline the advantages and disadvantages of the bulk method 5. Carry out processes to upgrade the genetic potential and performance of crops
Elements	**Importance:** improve the quality of agricultural products; increase the yield of crops, to meet specific consumers' needs, to achieve uniformity of plants, to obtain tolerant varieties **Reasons:** upgrade genetic potential, improve crop performance **Method of crop improvement:** selection (pedigree selection, mass selection, clonal selection), breeding/hybridization (pedigree method ,bulk method/back cross method/multiple or composite cross), hybridization method for cross pollinated crops (single cross method, three ways cross. double cross, synthetic cross) **Advantages of pedigree method:** elimination of undesirable characters, it permits increase homozygosis, suit crops where characters are easily combined **Disadvantages of pedigree method:** the method is time consuming, it is laborious, only suitable for crops with short life cycle, selection is done only in one environment) **Advantages of bulk method:** the method is simple and cheap to carry out, it is not labour intensive **Disadvantages of bulk method:** large population of plants is required to ensure retention of desired characteristics; it takes longer time than pedigree to obtain homogeneity
Learning Strategies	1. Working in groups students should: - understand and describe importance / objectives for improve crops varieties. - outline the advantages and disadvantages of pedigree and bulk methods 2. Students should observe demonstrations and practice the crossing in different types of crops (cross-pollinated and open-pollinated) and evaluate performance of crops.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to carry out two (2) crossing in different types of crops (cross-pollinated and open-pollinated) and evaluate performance of crops for all elements in learning outcome 5

S4	Module 4: Forage Conservation
Description	By the end of this module the learners should be able to carry out forage conservation principle in the fields
Learning Outcomes	1. Understand reasons forage conservation in the field 2. Describe the advantages and disadvantages of silage making 3. Describe types of silo used in forage conservation 4. Practice methods of forage conservation 5. Practice planting field fodder crops in the fields 6. Apply additives in silage making 7. Outline Silage Quality and losses 8. Understand how to calculate silage requirements in Dry Matter 9. Prepare standing forage
Elements	**Reasons:** forage for stock, feed for dry seasons, better utilization of available land, conserve forage can be sold **Advantages** of silage making: more nutrients are preserved, it has a few field loses, less dependent on weather conditions, it can be preserved for prolonged period, minimum loss of nutrients **Disadvantages** of silage making: it needs skills and great attention in operation, labour intensive exercise hence expensive, farmers cannot spare sufficient forage, it is bulky to store and handle, it is susceptible to losses, it must be fed soon after removal **Types of silos:** trench silo, clamp silos, bunker tower silos **Methods of forage conservation:** hay making, silage making **Additives:** crushed grains at the rate of 100kg per ton of silage, molasses at 20 to kg per ton of silage **Silage Quality:** be from high quality forage, have a ph of 4.2 or below, have 5% to 9% l arctic acid, be free of moulds and bad odds, be greenish to yellow colour, have a fine texture **Losses:** surface spoilage, seepage losses, gaseous losses **Calculate silage requirements:** dry matter, body weight, % silage **Standing forage:** cheapest, easiest and most commonly method for fodder conservation. it simply implies deferring cutting a portion of the forage for the dry season feed
Learning Strategies	1. Working in groups students should - understand reasons for forage conservation - outline and review the advantages and disadvantages forage conservation - describe and compare types of silo used in forage conservation - understand how to calculate silage requirements in Dry Matter 2. Students should observe demonstrations and practice as a team methods of forage conservation, planting field fodder crops in the fields, applying additives in silage making and prepare standing forage
Assessment	1. Written or oral explanations covering learning outcomes 1, 2 3, 7 and 8 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to practice methods of forage conservation, planting fodder crops, applying additives in silage making and preparing standing forage for all elements in learning outcomes 4, 5, 6 and 9.

S4	Module 5: Sustainable land management
Description	By the end of this module the learners should be able to recognise and apply the principles of sustainable land management
Learning Outcomes	1. Understand the importance of sustainable practices of land use management 2. Research forms of land use in the Republic of South Sudan 3. Research land titles in the field
Elements	**Land use management:** impact assessment, sustainable land management (sustainability), policies and regulation **Forms of land use:** agriculture, Forestry (Poles, timbers, fire woods, charcoal, wild animals ,control soil erosions), Wild life (National parks game reserves), Fisheries(lakes, rivers), Urban centres (centres, towns, cities, market places), communication: (roads, railways, air port), Recreation (swimming pools, public gardens, national parks, play grounds, stadiums), mortgage for loans (Land titles)
Learning Strategies	1. Working in group students study variety of land use issues and understand the sustainable land management and make report covering the forms of land use in The Republic of South Sudan.
Assessment	1. Written report and oral presentation showing that the student can understand the importance of sustainable land management and can research forms of land use in the Republic of South Sudan for all elements in learning outcomes 1 to 3.

Food Technology and Processing

S2	Module 1: Food Technology
Description	By the end of this module the learners should understand the elements of processing and preservation and be able to understand food safety
Learning Outcomes	1. Understand food composition 2. Outline processing and preservation techniques of food products 3. Understand the importance of food safety 4. Investigate food safety in South Sudan
Elements	**Food composition:** physicochemical, nutritional, microbiological, sensory aspect **Food products:** pulses, oilseeds, spices, fruits and vegetables, meat, fish, poultry, milk and milk products **Processing and Preservation:** freezing, smoking, salt, fermenting, pasteurisation, drying **Food safety:** quality, sanitation, food laws and regulations, packaging
Learning Strategies	1. Students should work in groups to learn and understand the food composition and nutritional value, aspects of processing and preservation techniques of food products for learning outcomes 1 and 2 2. Students should compile a report and investigate issues related to hygiene in food safety in South Sudan for learning outcome 3 and 4
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Written report and oral presentation on food safety in South Sudan for learning outcomes 3 and 4

S2	Module 2: Traditional Food Processing
Description	By the end of this module the learners should be able to compare and contrast modern and traditional food processing and production
Learning Outcomes	1. Compare and understand aspects of modern and traditional food processing 2. Understand aspects of traditional food processing 3. Familiarize and investigate new types of traditional foods 4. Explore neglected traditional food
Elements	**Traditional food processing:** fermenting, drying, smoking, oil processing **Modern food processing:** jams, juices, sweets, milk, yogurt, cheese, fish, poultry **Traditional food processing:** 'Duma', 'kwete', 'kenyimuru', dried or smoked meat, dried slices of sweet potatoes, dried vegetables leaves, oil processing in groundnut, sesame, groundnuts and Shear butter
Learning Strategies	1. Students should research, study and understand - the distinction between aspects of modern and traditional food processing - aspects of traditional food processing - new types of traditional foods - traditional foods of South Sudan
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Report and oral presentation covering two (2) examples of traditional food processing covering learning outcomes 1 to 4.

Horticulture

S1	Module 1: Nursery and Field Practices
Description	By the end of this module the learner should understand how to select, plant, prune and harvest horticultural crops.
Learning Outcomes	1. Understand cultivation practices and the use of horticultural tools 2. Understand planting practices in nursery seed beds 3. Understand general principles of field practices for horticultural crops 4. Understand e the use of fertilizers for horticultural crops 5. Select appropriate sites for nurseries 6. Prepare planting materials 7. Plant materials using different methods 8. Carry out pruning practices 9. Train horticultural crops 10. Harvest horticultural crops appropriately 11. Store harvested crops appropriately
Elements	**Horticultural tools:** tamper, hand cart, lining chain, planting trowel, pruning knives, hoe, pangas, garden rakes, slashers, spades, shovels, watering cans, hoe rakes/pronged hoes, Dutch or gardener's hoes, measuring tape, sisal string, pegs **Cultivation practices:** Primary cultivation (condition of the land, time of operation), secondary cultivation (number of operations, soil moisture/timing, and correct/final depth), tertiary cultivation (ridging, rolling and levelling), advantages and disadvantages of using seed or vegetative materials. **Planting practices in nursery seedbeds:** Time of planting, seed selection and treatment, selection of the planting materials and treatment, methods and depth of planting, spacing seed rate and plant population) **General principles of field practices for horticultural crops:** Root pruning, thinning, gapping, training/staking/propping, pruning, rogueing, earthing, pest and disease control) fertilizer applications (factors contribute;8ng to soil fertility in horticultural crops, ways of improving soil fertility, essential and non-essential elements, roles of macro-nutrients and micro-nutrients and how they are lost, organic and inorganic fertilisers and application of fertilisers in horticultural crops). **Fertilizers for horticultural crops:** NPK,DAP, copper, sulphur **Sites:** types of nursery beds (sunken, raised and flat), suitability, soils, topography, irrigation and drainage, light, pest and disease incidence **Preparations:** calculation of material requirement for a nursery structure for crop propagation, breaking seed dormancy by chitting /sprouting, seed inoculation, seed cleaning and seed treatment/ dressing), sorting seeds, planting seeds in the nursery, pricking out, hardening, pest control, disease control, removal of seedlings for transplanting **Plant Materials:** cuttings, budding, layering, marcotting, soft and hard wood for cuttings, leaves and stems for cuttings, bulbs, true seeds of horticultural crops like onions **Planting Methods:** direct (planting of seeds like carrots and other plant materials like seedlings, cutting, bulbs, corms and other planting materials), grafting (splice/whip,wedge,side,tongue,saddle,crown,cleft,bark and approach grafting), layering (tip, compound/serpentine, trench and mound), marketing and plant storage organs, stem/leaf cuttings (herbaceous, hard wood and semi hard wood), tissue culture materials, buddings (T –budding, inverted T-budding) **Pruning practices:** single stem, double stem, multiple stem pruning in coffee **Train horticultural crops:** Staking, propping up, making trellising, making frames (ring, parallel) stakes, pegging, coppicing, and pollarding, lopping and training horticultural crops **Harvest:** Stage and time of harvest, methods of harvest, processing, sorting and grading **Store:** types of stores, storage practices

S1	Module 1: Nursery and Field Practices
Learning Strategies	1. Students should work in groups to research study and discuss - the use of horticultural tools - cultivation practices - planting practices in nursery seed beds - general principles of field practices for horticultural crops - the use of fertilizers for horticultural crops 2. Students should observe demonstrations and practice: - choosing appropriate sites - preparation and use of planting materials with different methods - how to carry out pruning practices - how to train horticultural crops - how to harvest and storage horticultural crops appropriately
Assessment	1. Written or oral explanations covering learning outcomes 1 to 5. 2. Portfolio containing observation and product checklists showing the student carrying out nursery and field practices three (3) different horticultural plants using all elements for learning outcome 6 to 12.

S1	Module 2: Introduction to Horticulture
Description	By the end of this module the learner should understand plant structures and the need for crop rotation
Learning Outcomes	1. Understand plant structures and horticultural crops 2. Understand the objectives of vegetable rotation 3. Understand the water cycle in nature 4. Understand plant structures
Elements	**Horticultural crops:** vegetables, fruits, flowers, vines and roots. **Classify:** Pomology, floriculture, olericulture and vegetable gardening **Crop rotation:** importance, factors to be considered in crop rotation programmes, designation of crop rotation programme **Water cycle:** precipitation, evaporation, transpiration, clouds, rivers, water infiltration. **Plant structures:** leaves, flowers, stems, fruits and roots of plant parts, with their types, functions and classification.
Learning Strategies	1. Students should carry out independent research to study the principles and practices of horticulture - to acquire knowledge of horticultural crops - to classify horticultural crops - to describe the objectives of crop rotation - to describe the water cycle in nature - to understand plant structures
Assessment	1. Written or oral explanation covering learning outcomes 1 to 4.

S1	Module 3: Production of Vegetable Crops
Description	By the end of this module the learner should be able to cultivate and care for vegetable crops
Learning Outcomes	1. Prepare land for vegetable crops 2. Plant seed and planting material for vegetable crops 3. Maintain vegetable crops in the nursery and the field 4. Harvest and store vegetable crops 5. Process vegetable crops
Elements	**Vegetable crops:** fruit vegetable crops (tomatoes, cucumber, pumpkin, eggplant and okra), leafy vegetable crops (cabbage, onions, kale (Sukuma wiki) and Jews mallow), legume crops (common beans, groundnuts, soya beans, French beans, grams i.e. green and black, cow peas and pigeon peas), bulb vegetable crops (Onions and garlic), root vegetable crops (Carrots and Irish potatoes), floral vegetable crops (Cauli flowers), mushrooms **Prepare:** Land clearing, cultivation of the field (primary, secondary and tertiary) **Plant:** seeds, seedlings, vegetative planting materials **Maintain:** thinning, gapping, fertiliser application, desuckering, pruning and pinching out, earthing up, mulching, pest and disease control **Harvest:** timing, mechanical/manual
Learning Strategies	1. Students should observe demonstrations and practice in groups: - preparing land for vegetable crops - planting seeds and materials - maintaining vegetable crops - harvesting and storing vegetable crops - processing vegetable crops
Assessment	1. Portfolio containing observation and product checklists showing the student producing three (3) different vegetable crops covering all elements for learning outcome 1 to 5.

S2	Module 1: Stimulant Crops
Description	By the end of this module the learner should be able to cultivate and care for Stimulant crops
Learning Outcomes	1. Prepare land for stimulant crops 2. Plant seed and planting material for stimulant crops 3. Maintain stimulant crops in the nursery and the field 4. Harvest and store stimulant crops 5. Process stimulant crops
Elements	**Stimulant crops:** spices, green pepper, red pepper, tobacco and ginger **Prepare:** land clearing, cultivation of the field (primary, secondary and tertiary) **Plant:** planting seeds, seedlings and vegetative planting materials in the field **Maintain:** thinning, gapping, fertiliser application, desuckering, pruning and pinching out, earthing up, mulching, pest and disease control **Harvest:** timing, mechanical/manual
Learning Strategies	2. Students should observe demonstrations and practice in groups: - preparing land for stimulant crops - planting seeds and materials - maintaining stimulant crops - harvesting and storing stimulant crops - processing stimulant crops
Assessment	1. Portfolio containing observation and product checklists showing the student producing two (2) different stimulant crops covering all elements for learning outcome 1 to 5.

S2	Module 2: Fruit Crops
Description	By the end of this module the learner should be able to cultivate and care for fruit crops
Learning Outcomes	1. Prepare land for fruit crops 2. Plant seed and planting material for fruit crops 3. Maintain fruit crops in the nursery and the field 4. Harvest and store fruit crops 5. Process fruit crops
Elements	**Fruit crops:** mangoes, guavas, citrus fruits, bananas, pawpaw, passion fruits, pine apples, avocado, jackfruit and cashew nuts **Prepare:** land clearing, cultivation of the field (primary, secondary and tertiary) **Plant:** planting seeds, seedlings and vegetative planting materials in the field **Maintain:** thinning, gapping, fertiliser application, desuckering, pruning and pinching out, earthing up, mulching, pest and disease control **Harvest:** timing, mechanical/manual **Store:** types, advantages, disadvantages
Learning Strategies	3. Students should observe demonstrations and practice in groups: - preparing land for fruit crops - planting seeds and materials - maintaining fruit crops - harvesting and storing fruit crops - processing fruit crops
Assessment	2. Portfolio containing observation and product checklists showing the student producing two (2) different fruit crops covering all elements for learning outcome 1 to 5.

S2	Module 3: Beverage Crops
Description	By the end of this module the learner should be able to cultivate and care for beverage crops
Learning Outcomes	1. Prepare land for beverage crops 2. Plant seed and planting material for beverage crops 3. Maintain beverage crops in the nursery and the field 4. Harvest and store beverage crops 5. Process beverage crops
Elements	**Beverage crops:** tea, coffee, cocoa, hibiscus **Prepare:** land clearing, cultivation of the field (primary, secondary and tertiary) **Plant:** planting seeds, seedlings and vegetative planting materials in the field **Maintain:** thinning, gapping, fertiliser application, de-suckering, pruning and pinching out, earthing up, mulching, pest and disease control **Harvest:** timing, mechanical/manual **Store:** types, advantages, disadvantages
Learning Strategies	1. Students should observe demonstrations and practice in groups: - preparing land for beverage crops - planting seeds and materials - maintaining beverage crops - harvesting and storing beverage crops - processing beverage crops
Assessment	1. Portfolio containing observation and product checklists showing the student producing one (1) beverage crop covering all elements for learning outcome 1 to 5.

S3	Module 1: Ornamental Planets
Description	By the end of this module the learner should be able to cultivate and care for ornamental crops
Learning Outcomes	1. Prepare land for ornamental crops 2. Plant seed and planting material for ornamental crops 3. Maintain ornamental crops in the nursery and the field 4. Harvest and store ornamental crops 5. Process ornamental crops
Elements	**Beverage crops:** kikuyu grass, kie apple, pines, milk hedge euphorbia hirta, sisal **Prepare:** land clearing, cultivation of the field (primary, secondary and tertiary) **Plant:** planting seeds, seedlings and vegetative planting materials in the field **Maintain:** thinning, gapping, fertiliser application, desuckering, pruning and pinching out, earthing up, mulching, pest and disease control **Harvest:** timing, mechanical/manual **Store:** types, advantages, disadvantages
Learning Strategies	1. Students should observe demonstrations and practice in groups: - preparing land for ornamental crops - planting seeds and materials - maintaining ornamental crops - harvesting and storing ornamental crops - processing ornamental crops
Assessment	1. Portfolio containing observation and product checklists showing the student producing two (2) ornamental crops covering all elements for learning outcome 1 to 5.

S3	Module 2: Medicinal and aromatic crop plants
Description	By the end of this module the learner should be able to cultivate and care for medicinal and aromatic crop plants
Learning Outcomes	1. Prepare land for beverage crops 2. Plant seed and planting material for beverage crops 3. Maintain beverage crops in the nursery and the field 4. Harvest and store beverage crops 5. Process beverage crops
Elements	**Medicinal and aromatic crop plants:** Osmium basilica (Rihat in Local Arabic), pyrethrum, Neem Azaridatica indica, moringa, hibiscus Sabdarifa var. Sabdarifa kerekede) **Prepare:** land clearing, cultivation of the field (primary, secondary and tertiary) **Plant:** seed selection and treatment, selection of panting materials and treatment, correct planting methods, depth of planting, spacing, seed rate, plant population **Maintain:** Thinning, gapping, training/staking/propping, pruning, rogueing, earthing, pest and disease control **Harvest:** stage and time of harvest, methods of harvest, processing, sorting and grading **Store:** types, advantages, disadvantages
Learning Strategies	1. Students should observe demonstrations and practice in groups: - preparing land for medicinal and aromatic crops - planting seeds and materials - maintaining medicinal and aromatic crops - harvesting and storing medicinal and aromatic crops - processing medicinal and aromatic crops
Assessment	1. Portfolio containing observation and product checklists showing the student producing three (3) medicinal and aromatic crops covering all elements for learning outcome 1 to 5.

Soil Science

S1	Module 8: Soil fertility: Organic Manures
Description	By the end of this module the learners should understand soil fertility and be able to fertilise soils using organic manure
Learning Outcomes	1. Describe the importance of soil fertility 2. Describe the types of organic matter 3. Practice good farming methods to maintain soil fertility
Elements	**Organic matter:** organic manure, farm yard manure, compost **Farming methods:** crop rotation, inclusion of legumes, zero tillage
Learning Strategies	1. Work in groups to describe and present on importance of soil fertility including - types of organic matter as per all elements for earning outcome 1 and 2. 2. Students should observe demonstrations and practice good farming methods in the school demonstration plot and do classroom presentation covering 2 elements of learning outcomes 3.
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to demonstrate good farming methods in the school demonstration plot covering all elements for learning outcome 3

S2	Module 1: Soil fertility: Inorganic Fertilizers
Description	By the end of this module the learners should be able to use inorganic fertilizers appropriately
Learning Outcomes	1. Describe the use of inorganic fertilizers the fields 2. Know the importance of inorganic fertilizers for crop yield 3. Practice good farming methods to maintain soil fertility
Elements	**Inorganic fertilizers:** macro nutrients, micro nutrients, inorganic fertilizers, nitrogen cycle **Practice:** soil sampling, soil testing
Learning Strategies	1. Work in groups to discuss and present: - the use of inorganic fertilizers - the importance of inorganic fertilizers 2. Students should observe demonstrations and practice good farming methods in the school demonstration farm
Assessment	1. Written or oral explanations covering learning outcomes 1 and 2. 2. Portfolio containing observation and product checklists showing performance evidence of the student's ability to demonstrate good farming methods to maintain soil fertility covering all elements for learning outcome 3.

S3	Module 1: Fundamentals and practices of soil science
Description	By the end of this module the learners should be able to understand fundamentals and practices of soil science and its importance to agriculture, soil formation, soil fertility and soil degradation.
Learning Outcomes	1. Describe soil formation, nature of soils, soil fertility and losses, erosion and use of fertilizers. 2. Describe soil profile, classify soils, its chemical and physical properties 3. Understand the functions of micro and macro-nutrients, their deficiency symptoms in agricultural production 4. Identify different kinds of fertilizers 5. Identify soil constituents
Elements	**Soil formation:** factors of soil formation, soil fertility, soil degradation **Soil profile:** top soil, subsoil, parent material, chemical and physical composition of soil **Micronutrients and macronutrients:** plant growth, development **Fertilizers:** NPK, Urea, super-phosphate **Soil Constituents:** mineral matter, organic matter, air, water, living organisms
Learning Strategies	1. Work in groups to discuss and present on: - formation, nature of soils, soil fertility and losses, erosion and use of fertilizers - Soil profile, classify soils, its chemical and physical properties - The functions of micro and macro-nutrients, their deficiency symptoms in agricultural production - Different kinds of fertilizers 2. Students should observe demonstrations and practice identifying and carrying out experiments on soil constituents, soil profile, fertilizers and soil pH for all elements in learning outcome 5.
Assessment	1. Written or oral explanations covering learning outcomes 1 to 4. 2. Portfolio containing product checklists showing performance evidence of the student's ability to identify soil constituents covering all elements for learning outcome 5.

S3	Module 2: Soil fertility and fertilizer application
Description	By the end of this module the learners should be able to understand the aspects of plant nutrition, mineral deficiency and factors influencing mineral availability in soil and role of crop rotation in the crop system and soil fertility.
Learning Outcomes	1. Understand plant nutrition and soil fertility 2. Understand methods of fertilizer application and formulation 3. Understand role of crop rotation in the crop system and soil fertility
Elements	Organic and inorganic fertilizers; spray, mulching, digging in
Learning Strategies	1. Work in groups to discuss and make presentation on : - Plant nutrition and soil fertility - Fertilizers application and formation - Role of crop rotation in crop system and soil fertility
Assessment	1. Written or oral explanations covering learning outcomes 1 to 3.

Agricultural Programme Syllabuses

South Sudan