



NATIONAL BOARD FOR TECHNICAL EDUCATION

PLOT B BIDA ROAD, P.M.B. 2239, KADUNA, NIGERIA

NATIONAL DIPLOMA

AGRICULTURAL TECHNOLOGY

CURRICULUM AND COURSE SPECIFICATIONS

JUNE, 2026

PREFACE

The transformation of Nigeria's agricultural sector remains central to the nation's aspirations for sustainable economic growth, food security, job creation, industrial development, and poverty reduction. As agriculture continues to evolve in response to technological advancements, climate change, emerging global market demands, and the need for increased productivity across agricultural value chains, it has become imperative to ensure that curricula in Nigerian tertiary institutions remain relevant, responsive, and aligned with contemporary industry requirements. It is against this backdrop that we embarked on the comprehensive review and modernization of Agricultural curricula for Nigerian tertiary institutions. The review process was designed to address identified skills gaps, integrate emerging technologies and innovations, strengthen entrepreneurship and employability competencies, promote climate-smart agriculture, and align training programmes with the industry expectations and global best practices. The successful execution of this important project was made possible through the invaluable support and commitment of key stakeholders. I wish to express profound appreciation to the Honourable Minister of Education for providing the policy direction and leadership that facilitated this initiative. I also extend sincere gratitude to the Honourable Minister of Agriculture and Food Security and the Honourable Minister of Livestock Development for their unwavering support, technical contributions, and commitment to strengthening agricultural education and workforce development in Nigeria. Special appreciation goes to the Tertiary Education Trust Fund (TETFund) for providing the special intervention grant that enabled the conduct of nationwide skills gap analyses and supported the series of national curriculum review and development workshops. The findings from the skills gap studies provided critical evidence and industry insights that guided the review process and ensured that the curricula reflect current and future workforce requirements within the agricultural sector.

I also acknowledge with gratitude the immense contributions of the Sector Skills Council for Agriculture, whose expertise and industry perspectives greatly enriched the curriculum development process. Equally commendable are the efforts of members of the Implementation Committee, resource persons, industry experts, professional bodies, French Embassy in Nigeria, regulatory agencies, academic institutions, employers, development partners, and other stakeholders who devoted their time, knowledge, and experience to the various workshops and technical sessions. The revised curricula represent a collective national effort to produce graduates equipped with relevant knowledge, practical skills, digital competencies, entrepreneurial capabilities, and professional attitudes required to drive innovation and productivity across Nigeria's agronomy, forestry, fisheries and livestock sectors. It is my expectation that Institutions offering these programmes will faithfully implement the curricula and continue to collaborate with industry to ensure sustained relevance and quality. I commend all stakeholders for their dedication and contributions to this landmark achievement and look forward to the successful implementation of these curricula for the benefit of our dear nation.

Professor Idris M. Bugaje, FNSE
Chairman, Implementation Committee

EXECUTIVE SECRETARY

National Board for Technical Education (NBTE), Kaduna

ACKNOWLEDGEMENT

The National Board for Technical Education (NBTE) expresses its profound appreciation to all individuals and organizations whose invaluable support, expertise, and commitment made the successful review and modernization of the Agricultural Education curricula for Nigerian tertiary institutions possible. Our sincere gratitude goes to the Honourable Minister of Education for providing the policy direction and leadership that made this national initiative possible. We also appreciate the Honourable Minister of Agriculture and Food Security and the Honourable Minister of Livestock Development for their technical guidance, collaboration, and unwavering commitment to strengthening agricultural education and workforce development in Nigeria. The Board is particularly grateful to the Tertiary Education Trust Fund (TETFund) for providing the special intervention grant that funded the nationwide skills gap analyses, stakeholder engagements, curriculum review exercises, validation meetings, and development workshops. The evidence generated through these studies provided a solid foundation for developing curricula that are relevant, industry-driven, and responsive to national and global agricultural priorities.

Special appreciation is extended to the curriculum specialists, resource persons, academic experts, professional bodies, regulatory agencies, employers, industry practitioners, development partners, and representatives of public and private sector organizations who participated actively in the skills gap studies, technical sessions, validation exercises, and curriculum development workshops. Their diverse expertise and practical insights greatly enriched the quality and relevance of the curricula. We further appreciate the support of the French Embassy in Nigeria and other development partners for their collaboration in promoting excellence and innovation in technical and vocational education within the agricultural sector. Finally, NBTE expresses its gratitude to all tertiary institutions, researchers, facilitators, rapporteurs, technical staff, and administrative personnel whose commitment and hard work contributed to the successful completion of this important national assignment. The Board acknowledges that this achievement is the result of a collective effort and remains confident that the effective implementation of these curricula will contribute significantly to producing competent, innovative, and entrepreneurial graduates capable of advancing sustainable agricultural development, food security, and economic prosperity in Nigeria.

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GENERAL INFORMATION

1.0 PROGRAMME NOMENCLATURE

The programme shall be known as the **National Diploma (ND) in Agricultural Technology**.

2.0 PROGRAMME GOAL

The National Diploma in Agricultural Technology programme is designed to produce competent middle-level manpower equipped with practical skills, technical knowledge and professional competencies for sustainable agricultural production and management which includes crop production, livestock production, fisheries, forestry, soil management, mechanised farm operations and agricultural resource management, using modern, climate-smart and technology-driven agricultural practices.

3.0 OBJECTIVES OF THE PROGRAMME

On completion of the programme, the diplomates should be able to:

1. Carry out crop, livestock, fisheries and integrated farm production activities using modern agricultural practices.
2. Apply climate-smart, sustainable and environmentally friendly agricultural practices.
3. Operate and maintain basic farm tools, machinery and agricultural equipment safely and efficiently.
4. Apply soil fertility, land management and water conservation practices for sustainable agricultural production.
5. Carry out post-harvest handling, storage and value addition of agricultural produce.
6. Apply appropriate pest, disease and animal health management practices.
7. Collect, maintain and interpret farm records and agricultural data for decision-making.
8. Apply digital tools and ICT in agricultural production and farm management.
9. Apply agricultural extension, communication and rural development practices.
10. Demonstrate employment, entrepreneurship and self-reliance competencies in agricultural enterprises.

4.0 ENTRY REQUIREMENTS

The minimum entry requirements for admission into the ND Agricultural Technology programme are:

1. Four (4) O'Level credit passes in relevant subjects, including English Language, Mathematics, Agricultural Science or Biology, and one other relevant subject.
2. Evidence of registration with Joint Admissions and Matriculation Board (JAMB).

5.0 STRUCTURE AND DURATION OF THE PROGRAMME

The National Diploma in Agricultural Technology programme shall run for two academic years, comprising four semesters of classroom teaching, laboratory work, field practicals and workshop practice.

Each semester shall last 17 weeks, structured as follows:

- i. 15 contact weeks for lectures, practical sessions, laboratory work, fieldwork and workshops.
- ii. 2 weeks for registration, revision and examinations.

6.0 CURRICULUM STRUCTURE

The curriculum of the ND Agricultural Technology programme consists of the following components:

- i. General Studies/General Education courses
- ii. Foundation courses
- iii. Professional courses
- iv. Students Industrial Work Experience Scheme (SIWES)

SIWES shall take place in approved agricultural establishments after the second semester of Year I for a period of three to four months.

7.0 STAFFING REQUIREMENTS

7.1 Core Teaching Staff

The Department shall have a minimum of four (4) core teaching staff who possess at least an HND, BSc or equivalent qualification in Agricultural Technology or related disciplines.

7.2 Technical Staff

There should be technical staff disposition made up of:

i) **Technologist**

A technologist is a highly skilled professional trained at the Higher National Diploma (HND) level. They possess advanced technical and practical knowledge in their field and are capable of supervising operations, managing projects, operating modern equipment, and applying technology to solve practical problems. In agriculture, technologists help in farm management, research support, and the application of improved technologies.

ii) **Technician**

A technician is a middle-level manpower trained at the National Diploma (ND) level. Technicians are responsible for carrying out technical tasks, operating tools and equipment, and assisting technologists and professionals in practical activities. In agriculture, they assist in crop production, livestock management, farm maintenance, and data collection.

iii) **Farm Assistants**

Farm assistants are support workers who help in daily farm operations under supervision. They perform basic practical activities such as planting, weeding, feeding animals, harvesting, cleaning farm tools, and maintaining farm records. They contribute to the smooth running of farm activities and help improve productivity.

7.3 Headship of the Department

The Head of Department shall possess at least a first degree and a master's degree in Agricultural Science or related fields, shall not be below the rank of Senior Lecturer or its equivalent and must be registered with relevant professional body.

8.0 CERTIFICATION

A diplomate who successfully completes the programme shall be awarded the National Diploma (ND) in Agricultural Technology.

9.0 CONDITIONS FOR THE AWARD OF THE NATIONAL DIPLOMA

Institutions offering accredited programmes shall award the National Diploma to candidates who successfully complete the programme by passing the prescribed coursework, examinations, diploma project and the Students' Industrial Work Experience Scheme.

9.1 GRADING OF COURSES:

Courses shall be graded as follows:

MARK RANGE	LETTER GRADE	GRADE POINT
75% and above	A	4.00
70–74%	AB	3.50
65–69%	B	3.25
60–64%	BC	3.00
55–59%	C	2.75
50–54%	CD	2.50
45–49%	D	2.25
40–44%	E	2.00
Below 40%	F	0.00

9.2 CLASSIFICATION OF DIPLOMA

The National Diploma shall be classified as follows:

Classification	CGPA Range
Distinction	CGPA 3.50 – 4.00
Upper Credit	CGPA 3.00 – 3.49
Lower Credit	CGPA 2.50 – 2.99
Pass	CGPA 2.00 – 2.49

10.0 ACCREDITATION

The National Diploma in Agricultural Technology programme shall be accredited by the National Board for Technical Education before diplomates can be awarded the diploma certificate. Details of the accreditation process are available from:

The Executive Secretary

National Board for Technical Education (NBTE)

Plot B, Bida Road

P.M.B. 2239

Kaduna, Nigeria

11.0 PRACTICAL LOGBOOK

Each student shall maintain a practical logbook containing daily, weekly and semester summaries of practical activities from the beginning to the end of the programme. The logbook shall be checked, marked, endorsed and recorded by the lecturers concerned at the end of each week.

12.0 FINAL PROJECT

Final-year students shall carry out a project related to the programme or a core professional discipline. The project may be undertaken individually or in groups of not more than five students. However, each student shall submit an individual report. Project reports shall be properly supervised, well-presented and assessed according to departmental guidelines.

13.0 GUIDANCE NOTES FOR TEACHERS OF THE PROGRAMME

13.1 The new curriculum is drawn in unit courses. This is in keeping with the provisions of the National Policy on Education which stress the need to introduce the semester credit units which will enable a student, who so wishes, to transfer the units already completed in an institution of similar standard from which he/she is transferring.

13.2 In designing the units, the principle of the modular system by product has been adopted, thus making each of the professional modules, when completed provides the student with technician operative skills, which can be used for employment purposes.

13.3 As the success of the credit unit system depends on the articulation of programmes between the institution and industry, the Curriculum content has been written in behavioral objectives, so that the expected performance of the student is clear to all students who successfully completed some of the courses or the diplomates of the programme. There is a slight departure in the presentation of the performance-based curriculum which requires the conditions under which the performance is expected to be carried out and the criteria for the acceptable levels of performance. It is a deliberate attempt to further involve the staff of the department teaching the programme to write their own curriculum stating the conditions existing in their institution under which the performance can take place and follow that with the criteria for determining an acceptable level of performance. Departmental submission on the final curriculum may be vetted by the Academic Board of the institution. Our aim is to continue to see to it that a solid internal Evaluation system exists in each institution for ensuring minimum standard and quality of education in the programmes offered throughout the polytechnic system.

13.4 The teaching of theory and practical work should, as much as possible, be integrated. Practical exercises, especially those in professional courses and laboratory work should not be taught in isolation from the theory. For each course, there should be a balance of theory to practice in the ratio of 50:50 or 60:40 or the reverse.

14.0 GUIDELINES ON SIWES

For the smooth operation of SIWES, the following guidelines shall apply:

14.1 Placement of Students

Institutions offering the ND programme shall arrange appropriate SIWES placements for students in relevant agricultural establishments. By the end of the second semester of the first academic session, six copies of the master list showing students' placement locations shall be submitted to the Executive Secretary, NBTE, for authentication and onward transmission to the Industrial Training Fund.

The Placement Officer shall discuss and agree with the industry-based supervisors on:

1. The task inventory of what students are expected to experience during the attachment.
2. The evaluation procedure for students by both the industry-based supervisor and the institution-based supervisor.
3. The final grading procedure, which should give significant weight to the assessment by the industry-based supervisor.

14.2 Evaluation of Students During SIWES

Students shall be evaluated based on:

1. Punctuality.
2. Attendance.
3. General attitude to work.
4. Respect for authority.
5. Interest in the field or technical area.
6. Technical competence as potential technicians.

14.3 Grading of SIWES

Institutions shall adopt the uniform SIWES grading scale agreed upon by TVET institutions. SIWES shall be graded on a **Pass/Fail** basis.

Failure in SIWES indicates that the student has not demonstrated sufficient interest or competence in the field. A student who satisfies all other requirements but fails SIWES may be allowed to repeat the SIWES attachment at his or her own expense.

14.4 Institution-Based Supervision

The institution-based supervisor shall visit students during SIWES and initial their logbooks during each visit. The supervisor shall assess the extent to which the objectives of the scheme are being achieved and assist students with any challenges related to assigned tasks.

14.5 Frequency of Visits

Institutions shall ensure that students on industrial attachment are visited:

1. Within one month of placement.
2. Six weeks after the first visit.
3. During the final month of attachment.

14.6 Student Stipend

The rate of stipend payable to students shall be determined from time to time by the Federal Government after consultation with the Federal Ministry of Education, the Industrial Training Fund and NBTE.

15.0 Guidelines on Mandatory Skills Qualification

Institutions shall comply with the Guidelines for the Implementation of Mandatory Skills Qualification in Nigerian Polytechnics, as published by NBTE.



CURRICULUM TABLE**Year I - Semester I**

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 101	Use of English I	2	0	0	2	2
2.	GNS 111	Citizenship Education I	2	0	0	2	2
3.	COM 111	Introduction to Computing	2	0	2	4	4
4.	MSQ 111	Mandatory Skills Qualification	1	0	1	2	2
5.	AGR 101	Introduction to Agriculture	1	0	2	3	3
6.	MEC 113	Basic Workshop Technology and Practice	1	0	3	4	4
7.	AGT 111	Climate-Smart and Precision Crop Production	1	0	3	4	4
8.	AGT 112	Soil Health and Digital Land Management	1	0	3	4	4
9.	AGT 113	Modern Animal Production and One Health Systems	1	0	3	4	4
10.	AGT 114	ICT Applications in Agriculture	1	0	2	3	3
11.	AGT 115	Farm Woodland and Environmental Management	1	0	3	4	4
TOTAL			14	0	22	36	36

Year I - Semester II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 102	Communication in English I	2	0	0	2	2
2.	GNS 121	Citizenship Education II	2	0	0	2	2
3.	ENT 126	Introduction to Entrepreneurship I	2	0	1	3	3
4.	AGT 121	Applied Crop Production and Field Techniques	1	0	3	4	4
5.	AGT 122	Soil Fertility and Land Management Practices	1	0	3	4	4
6.	AGT 123	Animal Production I (Monogastric)	1	0	3	4	4
7.	AGT 124	Fisheries and Aquaculture Production	1	0	3	4	4
8.	AGT 125	Agro-Climatology	1	0	2	3	3
9.	AGT 126	Sustainable Micro Livestock Production and Apiculture	1	0	2	3	3
10.	AGT 127	Integrated Farm Practice I	0	0	2	2	2
11.	AGT 128	Farm Engineering, Power and Mechanization	1	0	3	4	4
TOTAL			13	0	22	35	35

Year II - Semester I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 201	Use of English II	2	0	0	2	2
2.	ENT 216	Introduction to Entrepreneurship II	2	0	1	3	3
3.	AGR 201	Research Methods and Experimental Design	1	0	1	2	2
4.	AGT 211	Crop Production and Precision Farming	1	0	3	4	4
5.	AGT 212	Animal Production II (Ruminants)	1	0	3	4	4
6.	AGT 213	Farm Records and Agribusiness Planning	1	0	1	2	2
7.	AGT 214	Digital Agriculture and Data Management	1	0	2	3	3
8.	AGT 215	Agricultural Mechanization and Smart Farm Systems	1	0	2	3	3
9.	AGT 216	Basic Horticultural Crop Production	1	0	2	3	3
10.	AGT 217	Students' Industrial Work Experience Scheme (SIWES)	0	0	4	4	4
TOTAL			11	0	19	30	30

Year II - Semester II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 202	Communication in English II	2	0	0	2	2
2.	AGT 221	Integrated Farm Practice	0	0	3	3	3
3.	AGT 222	Postharvest Technology and Food Safety Systems	1	0	2	3	3
4.	AGT 223	Climate-Smart Agriculture and Sustainability Systems	1	0	2	3	3
5.	AGT 224	Principles of Genetics, Breeding and Biotechnology in Agriculture	1	0	1	2	2
6.	AGT 225	Soil Fertility, Conservation and GIS Applications	1	0	3	4	4
7.	AGT 226	Agricultural Extension, Digital Advisory Systems and Rural Development	1	0	1	2	2
8.	AGT 227	Basic Plant Health Management	1	0	2	3	3
9.	AGT 228	Agricultural Economics and Value Chain Systems	1	0	1	2	2
10.	AGT 229	Project	0	0	4	4	4
TOTAL			9	0	19	28	28

KEY: L= Lectures (hours/week), T= Tutorial (hours/week), P= Practical (hours/week) CH = Contact Hours (hours/week) CU = Credit Unit



INTRODUCTION TO AGRICULTURE

PROGRAMME: AGRICULTURE COMMON COURSES — NATIONAL DIPLOMA (ND)		
COURSE TITLE: INTRODUCTION TO AGRICULTURE	COURSE CODE: AGR 101	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with the knowledge and skills of agricultural, its sub-sectors, and current developments.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the basic principles of crop science; 2.0 Understand the basic principles of animal science; 3.0 Know the scope of forestry; 4.0 Appreciate the historical development of fisheries in Nigeria; 5.0 Know current developments and emerging trends in Nigerian agriculture.		

PROGRAMME: AGRICULTURE COMMON COURSES — NATIONAL DIPLOMA (ND)							
COURSE TITLE: INTRODUCTION TO AGRICULTURE				COURSE CODE: AGR 101		CONTACT HOURS: 3 HOURS/WEEK	
				CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: I				PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL							
GOAL: This course is designed to equip students with the knowledge and skills of agricultural scope, its sub-sectors, and current developments.							
General Objective 1.0: Understand the basic principles of crop science							
THEORETICAL CONTENT				PRACTICAL CONTENT			
Week	Specific Learning Outcome		Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1 – 5	1.1	Outline the history of agricultural development and administration in Nigeria	Give a brief history of agriculture in Nigeria using charts and local examples	Textbooks, charts, agro-ecological zone map of Nigeria, FMAFS/IITA reports, projector, NIMET rainfall data, storage facility, erosion control	- Write technical report on a visit to farm practicing at least two farming systems and compare management practices - Identify crops suited to each agro-ecological zone on a Nigeria map - Write a short report on observations	Guide student to: - Arrange farm visit and guide observation of farming systems - Carry out map exercise and zone-crop matching activity - Review farm visit reports and give feedback - Carry out storage inspection and moisture measurement exercise	Nearby farm, observation guide, Nigeria agro-zone map, field notebooks, transport Grain samples, hermetic bags, moisture meter, metal bin, farmer interview guide, field notebooks Dibble sticks,
	1.2	List types of farming systems: monocropping, mixed cropping, relay cropping, continuous cropping, shifting cultivation,	- Describe each farming system with diagrams and discuss land use and soil implications - Use a Nigeria agro-ecological				

	1.3	plantation farming etc. Explain the influence of each farming system on crop yield and soil management	zone map to explain zone characteristics and crops ▪ Engage students through questioning and short discussions	diagrams, projector Tillage implement diagrams, NASC seed certification guide, textbooks, projector, etc.	from the farm visit • Inspect grain stored in a sack, hermetic bag, and metal bin; measure moisture content and compare keeping quality • Interview a local farmer on how customs or land tenure affects their farming decisions and present findings	• Conduct interview and debrief findings with class • Carry out erosion observation on campus farm and facilitate class discussion	hoes, seeds, measuring tape, germination record sheet, seed packets Practical manual etc.
	1.4	Describe the major agro-ecological zones of Nigeria and their characteristic crops	▪ Discuss social factors affecting farming using local Nigerian examples		• Identify signs of erosion on the campus farm and suggest control measures	• Demonstrate zero-till and conventional seeding methods side by side	
	1.5	Explain the effect of social factors such as customs, taboos, and land tenure on crop production in Nigeria	▪ Explain climatic factors and their effects on crop growth, pest incidence, and storage		• Demonstrate zero-till seeding using a dibble stick and compare with a hoe-tilled plot	• Carry out germination recording and comparison between both plots	
	1.6	Explain how climatic factors affect crop production: rainfall onset, dry spells, drought, sunshine, day length etc.	▪ Describe storage systems and compare storage quality using moisture and pest data		• Record germination percentage from both plots after 7 days	• Carry out seed label reading and handling exercise	
	1.7	Describe types of crop storage	▪ Describe erosion control methods with diagrams and field examples		• Identify farm seeds and check labels for purity and viability		
	1.8	Explain the	▪ Describe land preparation methods using				

		keeping quality of silos, hermetic bags, rhombus stores, and barns 1.9 Explain different types and methods of erosion control including contouring and terracing 1.10 Describe methods of land preparation 1.11 Explain merits and demerits of manual and mechanized farming. 1.12 Explain minimum, zero, and conventional tillage and current trends in Nigeria 1.13 List common planting methods practiced in Nigeria 1.14 Explain seed quality in terms of purity, viability etc.	diagrams of implements used ▪ Explain tillage systems and discuss current trends with Nigerian farm examples ▪ Explain planting methods and seed quality requirements using NASC guidelines		data		
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General Objective 2.0: Understand the basic principles of animal science.						
6 – 8	2.1 Explain the interrelationship between crop production and animal production 2.2 List important farm animals in Nigeria and their major products 2.3 Describe common wild animals in Nigeria and their effects on crops and vegetation 2.4 Describe common wild animals based on vegetation zones	• Explain crop-livestock integration using Nigerian farm examples • Discuss major livestock species and products • Discuss wild animal distribution across Nigerian vegetation zones using wildlife maps	Farm animal charts, livestock production statistics, wildlife zone maps, photographs, projector	• Carry out visit to mixed crop-livestock farm • Observe how animal manure is used on crop plots • Identify 10 farm animals and 5 wild animals at farms • Interview the farmer on crop-livestock integration benefits • Write a short report	Guide students to: • Carry out visit to mixed crop-livestock farm • Observe how animal manure is used on crop plots • Identify 10 farm animals and 5 wild animals at farms • Interview the farmer on crop-livestock integration benefits • Write a short report	Mixed crop-livestock farm, animal photograph cards, Nigeria wildlife zone map, interview guide, field notebooks, transport, Practical manual
General Objective 3.0: Know the scope of forestry.						
9 – 11	3.1 Define forestry 3.2 Distinguish between production forestry, social forestry, and agroforestry 3.3 Describe the direct and indirect benefits of forests 3.4 Explain forest regeneration and establishment	• Define forestry and explain the three types with Nigerian examples • Describe direct and indirect forest benefits using economic data • Explain plantation establishment steps and	Textbooks, Journals, Internet, Whiteboard, Marker, Projector	• Carry out visit to forest nursery or plantation • Identify 5 major timber species • Record nursery operations observed • Measure the girth and estimate the height of 3 trees on campus using	Guide students to: • Carry out visit to forest nursery or plantation • Identify 5 major timber species • Record nursery operations observed • Measure the girth and estimate the height of 3 trees on campus	Forest nursery or plantation, clinometer, measuring tape, tree volume tables, wood samples, identification manual, field notebooks, transport,

	3.5 Enumerate major indigenous and exotic timber species in Nigeria 3.6 State major indigenous and exotic timber species uses 3.7 Outline the structure and organisation of forest services in Nigeria	silvicultural systems used in Nigeria • Explain uses major timber species • Explain forest services structure from federal to state level		appropriate equipment • Identify 10 timber species from leaf, bark, and wood samples • Match botanical and local names • Write activity report	using appropriate equipment • Identify 10 timber species from leaf, bark, and wood samples • Match botanical and local names • Write activity report	Practical manual
General Objective 4.0: Comprehend the historical development of fisheries in Nigeria.						
12 –13	4.1 Describe the status of fisheries resources and production in Nigeria 4.2 Explain the importance of fish in human nutrition 4.3 Define rivers, flood plains, lake basins, lagoons, and estuaries 4.4 Describe fisheries potential of rivers, flood plains, lake basins, lagoons, and estuaries 4.5 Describe the physical,	• Discuss the status of fisheries resources and production in Nigeria • Explain nutritional value of fish and its role in Nigerian food security • Discuss each water body type and describe its fisheries characteristics • Explain measurement of	FAOSTAT fisheries data, Nigeria fisheries reports, water body diagrams, aquatic ecology charts, water quality test kits, projector	• Collect water samples from a nearby stream or pond • Measure temperature, pH, and dissolved oxygen and record results • Identify common fish species in Nigeria and their water body habitat • Write a short report comparing water quality findings with standard values for	Guide students to: • Collect water samples from a nearby stream or pond • Measure temperature, pH, and dissolved oxygen and record results • Identify common fish species in Nigeria and their water body habitat • Write a short report comparing water quality findings with standard values for fish production	Portable water quality test kit, sample containers, fish identification cards, notebooks, transport, Practical manual

	chemical, turbidity and biological properties of the aquatic environment	water quality parameters and their role in fish health		fish production		
General Objective 5.0: Know current developments and emerging trends in Nigerian agriculture.						
14 –15	5.1 Explain digital and precision agriculture 5.2 State examples of ICT tools used in Nigerian farming 5.3 Describe climate-smart agriculture 5.4 Explain how Nigerian farmers are adapting to climate change 5.5 Explain the One Health concept and its relevance to agriculture (the link between animal health, human health, plant health, and the environment) 5.6 Describe the importance of agribusiness and value chain development in modern Nigerian agriculture 5.7 Explain the roles of	• Discuss digital agriculture tools with local Nigerian examples. • Explain climate-smart agriculture and discuss adaptation strategies used by Nigerian farmers • Explain the One Health concept using real disease outbreak examples from Nigeria • Discuss value chain development and agribusiness opportunities • Discuss the roles of gender and youth in agriculture using current data. • Discuss aquaculture growth	Textbooks, Journals, Internet, Whiteboard, Marker, Projector, agricultural apps, climate change charts, One Health materials, value chain diagrams, aquaculture data, videos	• Record farm data for a campus plot using a mobile phone app: (planting date, inputs used, and estimated yield) • Carry out visit to fish farm or aquaculture unit. • Observe production practices. • Research one current agricultural development programme in Nigeria and present findings to the class • Conduct a simple One Health risk assessment on the campus farm • Identify one animal-human-environment health linkage	Guide students to: • Record farm data for a campus plot using a mobile phone app: (planting date, inputs used, and estimated yield) • Carry out visit to fish farm or aquaculture unit and • Observe production practices. • Research one current agricultural development programme in Nigeria and present findings to the class • Conduct a simple One Health risk assessment on the campus farm • Identify one animal-human-environment health linkage	Smartphones, farm management app, campus farm plot, fish farm or aquaculture unit, One Health risk assessment guide, presentation guide, field notebooks, transport, etc.

	gender, youth, and social inclusion in agricultural development in Nigeria.	data and fish farming enterprise opportunities.				
	5.8 Describe the growth of aquaculture in Nigeria and its importance for food security and enterprise development.					
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

CLIMATE-SMART AND PRECISION CROP PRODUCTION

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: CLIMATE-SMART AND PRECISION CROP PRODUCTION	COURSE CODE: AGT 111	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of modern climate-smart and precision agriculture techniques in crop production.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles of crop production; 2.0 Know modern crop production practices; 3.0 Know basic digital tools in crop production; 4.0 Understand the implementation of climate-smart agricultural practices; 5.0 Know soil fertility management practices; 6.0 Understand the identification and control of pests and diseases; 7.0 Understand Good Agricultural Practices (GAP) in crop production.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: CLIMATE-SMART AND PRECISION CROP PRODUCTION				COURSE CODE: AGT 111		CONTACT HOURS: 4 HOURS/WEEK
				CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I				PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of modern climate-smart and precision agriculture techniques in crop production.						
GENERAL OBJECTIVE 1.0: Understand the principles and importance of crop production.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Explain crop production. 1.2 Discuss the scope of crop production 1.3 Explain the branches of crop production (arable, horticulture, plantation crops) 1.4 Describe importance of crop production in food security, income generation and national economy 1.5 Explain cropping systems (monocropping, mixed cropping, crop rotation)	• Explain concepts using familiar local crops and practical examples • Discuss relevance using Nigerian agricultural context • Explain cropping systems	Textbooks, Journals, Internet, Projector, Marker board, Marker, Charts, statistics, etc.	• Identify major field and horticultural crops and their uses. • Identify crop products and by-products in local markets. • Observe cropping systems in field • Record observations.	Guide students to: • Identify major field and horticultural crops and their uses. • Identify crop products and by-products in local markets. • Observe cropping systems in field • Record observations.	Crop samples, pictures, market samples, farm plots, Practical manual

General Objective 2.0: Know land preparation and planting techniques.						
3 – 5	2.1 Explain types and methods of land preparation (manual and mechanised) and their suitability 2.2 Explain different planting methods. 2.3 Explain appropriate spacing, and estimation of plant population. 2.4 Explain nursery establishment techniques and their importance in crop production 2.5 Explain transplanting, thinning and supplying operations and their importance	• Explain land preparation methods using local farming practices and compare manual vs mechanised systems • Discuss correct spacing using ropes, pegs and measuring tape • Explain nursery establishment procedures (site selection, bed preparation, watering, shading) • Describe transplanting, thinning and supplying operations with practical examples.	Textbooks, Journals, Internet, Articles, Projector, Diagrams/ch arts, Marker board, Marker, videos, etc.	• Carry out land clearing, tillage, ridging and bed formation using appropriate tools • Perform planting operations using correct spacing, depth, methods and estimation of plant population. • Establish nursery beds, sow seeds and manage watering and shading • Carry out transplanting, thinning and supplying operations on field plots	Guide students to • Demonstrate proper handling and use of farm tools and supervise students during land preparation • Perform planting operations using correct spacing, depth, methods and estimation of plant population. • Demonstrate nursery bed preparation and supervise seed sowing and watering.	Cutlasses, hoes, rakes, measuring tape, ropes, pegs, seeds, seedlings, nursery materials, watering cans, farm plots, Practical manual.
General Objective 3.0: Know basic digital tools in crop production						
6 – 7	3.1 Explain ICT tools used in agriculture (mobile apps, sensors, GPS). 3.2 Explain basic principles of GPS and farm mapping 3.3 Explain farm data collection, storage and	• Explain digital agriculture concepts using simple and familiar examples • Discuss use of mobile apps for farm records and data collection	Textbooks, Journals, Internet, Projector, Diagrams/ch arts, Marker board,	• Use mobile phones/apps to record farm data (planting date, inputs, yields) • Carry out simple farm mapping using GPS or mobile-based tools	Guide students to • Use mobile apps for data entry • Demonstrate GPS use and supervise students during mapping exercise	Smartphones, mobile apps, GPS devices, record books, sample data sheets Practical manual

	use in decision making 3.4 Explain the importance of data in farm management and decision making	• Discuss GPS and precision agriculture tools • Explain importance of data in farm management and decision making.	Marker, Simple farm apps, GPS devices etc.	• Record farm data manually and digitally • Organize farm data manually and digitally • Analyze farm data manually and digitally • Interpret farm data for decision making.	• Record and interpret data.	
General Objective 4.0: Understand the implementation of climate-smart agricultural practices						
8 – 9	4.1 Explain climate change 4.2 Explain the effects of climate change on crop production 4.3 Explain climate adaptation and mitigation strategies in agriculture 4.4 Explain the concept of climate-resilient crops and sustainable practices	• Explain climate change using local examples (drought, flooding, irregular rainfall) • Discuss adaptation strategies such as mulching, irrigation, and crop selection • Discuss the concept of climate-resilient crops and sustainable practices	Textbooks, Journals, Internet, Articles, Projector, Diagrams/charts, Marker board, Marker, Case, studies, videos, Improved seed varieties, etc.	• Analyse climate charts and case studies to sustainable practices • Apply mulching, shading and moisture conservation techniques on field plots • Practice water management techniques (basins, ridges, simple irrigation) • Establish trial plots using improved or climate-resilient crop varieties	Guide students to: • Analyse climate charts and case studies to sustainable practices • Demonstrate mulching and water conservation techniques and supervise students • Establish and manage trial plots	Organic materials (mulch), farm tools, improved seeds, watering cans, farm plots, Practical manual.
General Objective 5.0: Know soil fertility management practices						
10 – 11	5.1 Explain soil fertility, essential plant nutrients (macro and micro). 5.2 Describe their functions in crop growth 5.3 Explain types of	• Explain soil fertility using real soil samples and local farm scenarios • Discuss macro and micronutrients and	Textbooks, Journals, Internet, Articles, Projector, Diagrams/ch	• Conduct soil sampling and basic field assessment of soil condition (texture, colour, moisture) • Identify types of	Guide students to: • Demonstrate proper soil sampling techniques step-by-step and supervise students during	Soil sampling tools, Soil testing kits fertilizers

	fertilizers (organic and inorganic) and their characteristics 5.4 Explain methods and timing of fertilizer application and factors affecting efficiency	link deficiencies to crop symptoms • Discuss organic and inorganic fertilizers, including advantages and limitations • Explain appropriate methods and timing of fertilizer application with examples	arts, Marker board, Marker, Soil, Samples, Fertilizer Samples, Diagrams, deficiency charts, etc.	fertilizers (organic and inorganic) • Apply fertilizers correctly on field plots using appropriate methods (basal and top dressing) and correct dosage. • Record activities.	practice • Display fertilizer types and guide students in identification and handling • Demonstrate correct fertilizer application methods and supervise field application.	(organic & inorganic), farm tools, measuring containers, demonstration plots, Practical manual
General Objective 6.0: Understand the identification and control of pests and diseases						
12 – 13	6.1 Explain common crop pests and diseases. 6.2 Describe common crop pests and diseases symptoms 6.3 Explain different methods of pest and disease control (cultural, biological and chemical, etc.) 6.4 Explain safe handling and application of agrochemicals and environmental safety practices	• Explain types of pests (insects, rodents) and diseases (fungal, bacterial, viral) using charts and real examples • Describe visible symptoms of pest and disease attack on crops • Explain different control methods and when each is appropriate • Explain safety precautions in handling and	Textbooks, Journals, Internet, Projector, Diagrams/charts, arts, Marker board, Marker, Pest and disease, images, sample Chemicals, Safety Guidelines etc.	• Identify pests and disease symptoms on crops in the field. • Carry out field scouting and monitoring of pest infestation • Apply pest and disease control measures safely using appropriate tools and personal protective equipment (PPE). • Record activities.	• Take students to field plots for pest and disease identification and supervise scouting activities • Demonstrate proper mixing and application of agrochemicals • Supervise students during spraying and ensure use of PPE	Crop plants (Healthy and Diseased), hand lens, sprayers, agrochemicals, PPE (gloves, masks), field plots, Insect box, Charts, Practical manual

		applying agrochemicals.				
General Objective 7.0: Understand Good Agricultural Practices (GAP) in crop production						
14 – 15	7.1 Explain the principles of Good Agricultural Practices (GAP) in crop production 7.2 Explain sources of contamination 7.3 Explain preventive measures in crop production 7.4 Explain farm record keeping, traceability and their importance in food safety and marketing	• Explain GAP principles using real farm scenarios and food safety examples • Discuss sources of contamination (soil, water, chemicals, handling) and their effects • Explain hygiene, sanitation and safe handling practices in crop production • Describe the importance of record keeping and traceability in modern agriculture.	Textbooks, Journals, Internet, Articles, Projector Diagrams/ch arts, Marker board, Marker, GAP manuals, Case studies, Videos, Record templates, etc.	• Practice field sanitation and hygiene. • Identify contamination risks on farm and suggest preventive measures • Maintain simple farm records for traceability	• Demonstrate proper field hygiene and sanitation practices • identify contamination risks in field situations • Supervise students during record keeping exercises (manual/digital) • Review students' records and provide corrections and feedback	Cleaning tools, PPE, record books, sample record sheets, farm plots, Practical manual
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

SOIL HEALTH AND DIGITAL LAND MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: SOIL HEALTH AND DIGITAL LAND MANAGEMENT	COURSE CODE: AGT 112	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with skills and knowledge in soil properties, soil fertility management, and the application of digital tools in land evaluation and management for sustainable agricultural production.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand soil formation, composition and properties; 2.0 Know the classification of soil types and their characteristics; 3.0 Understand soil health fundamentals 4.0 Know soil fertility and nutrient management practices; 5.0 Know soil sampling, testing and analysis; 6.0 Appreciate the application of soil and water conservation techniques; 7.0 Know the application of digital tools in land and soil management.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: SOIL HEALTH AND DIGITAL LAND MANAGEMENT		COURSE CODE: AGT 112		CONTACT HOURS: 4 HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: I		PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with skills and knowledge in soil properties, soil fertility management, and the application of digital tools in land evaluation and management for sustainable agricultural production.						
GENERAL OBJECTIVE 1.0: Understand soil formation, composition and properties						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Explain soil formation processes. 1.2 Describe factors of soil formation. 1.3 Explain soil composition. 1.4 Describe physical properties of soil 1.5 Explain the importance of soil properties in crop production	• Explain soil formation using real-life examples (rock breakdown, organic matter decay) • Explain soil profile and formation processes • Explain soil components using actual samples • Explain the relationship of soil physical properties to crop performance (e.g., sandy vs clay soil) and their importance in crop production	Textbooks, Journals, Internet, Articles, Projector, Diagrams/charts, Marker Board, Soil samples notebooks, etc.	• Identify different soil components • Observe soil colour, texture and structure. • Carry out comparative analysis of different soil samples based on physical properties. • Record observations of soil characteristics	Guide students to • Provide soil samples for examination • Demonstrate simple methods of identifying soil texture (feel method, etc.) • Observe and record properties	Soil samples, trays, water, Practical manual

General Objective 2.0: Know the classification of soil types and their characteristics						
3 - 4	2.1 Outline major soil types (sandy, clay, loamy) and their characteristics 2.2 Describe soil classification based on texture and structure 2.3 Explain soil profile and horizon development (O, A, B, C horizons) 2.4 Describe characteristics and suitability of different soils for crop production. 2.5 Explain soil drainage, water retention and aeration in relation to soil types 2.6 Describe limitations of different soil types and how they affect crop growth	• Explain differences between sandy, clay and loamy soils using real soil samples. • Explain soil profile using diagrams and soil pits where possible • Discuss soil types and relate them to crop suitability (e.g., sandy for root crops, clay for water retention, etc.) • Explain soil horizons	Textbooks, Journals, Internet, Projector, Diagrams/charts, Marker board, Marker, Soil profile, illustrations, notebooks, etc.	• Identify soil samples based on texture (feel method, etc.) • Observe soil profile layers where available • Perform test to compare soil types based on water retention, drainage properties etc. • Determine suitability of different soils for specific crops • Record observations.	Guide students to • Provide multiple soil samples for comparison • Demonstrate texture-by-feel method. • Supervise soil classification exercises • Observe soil profile (pit or exposed land) • Take crop suitability decisions	Soil samples, soil pit, water, trays, Soil samples, Practical manual.
General Objective 3.0 Understand soil health fundamentals						
5 - 6	3.1 Define soil health. 3.2 Differentiate soil health from soil fertility and soil quality. 3.3 Explain the four functions of healthy	• Explain soil health. • Differentiate soil health from soil fertility and soil quality. • Discuss the four	Textbooks, Journals, Internet, Articles, Projector, Diagrams/ch	• Observe healthy and degraded soil samples. • Compare water infiltration between healthy and	Guide students to: • Observe healthy and degraded soil samples. • Compare water infiltration	Healthy and degraded soil samples, trays, hand lens, practical manual, Earthworms, soil

	soil. 3.4 Describe the physical, chemical and biological components of soil health. 3.5 Explain the importance of soil biodiversity. 3.6 Explain how healthy soils support climate resilience, food security and sustainable agriculture. 3.7 Explain causes of soil health decline 3.8 Explain basic soil restoration	functions of healthy soil. - Describe the physical, chemical and biological components of soil health. - Discuss the importance of soil biodiversity. - Describe how healthy soils support climate resilience, food security and sustainable agriculture. - Discuss causes of soil health decline - Explain basic soil restoration	arts, Marker board, Marker, Case examples, Field illustrations, Videos, etc	degraded soils. - Observe earthworms and beneficial soil organisms. - Record finding	between healthy and degraded soils. - Observe earthworms and beneficial soil organisms. - Record finding	samples, trays, hand lens, microscope
General Objective 4.0: Know soil fertility and nutrient management practices						
7 – 8	4.1 Explain the concept of soil fertility and plant nutrition 4.2 Explain essential plant nutrients (macro and micro nutrients) and their functions 4.3 Describe sources of plant nutrients. 4.4 Explain methods of fertilizer application.	- Explain soil fertility using crop performance examples - Discuss nutrient classification and functions - Display samples of fertilizers and organic manures - Explain fertilizer application methods	Textbooks, Journals, Internet, Projector, Diagrams/charts, Marker board, Marker, Fertilizer, samples,	- Identify different types of fertilizers and organic manures - Apply fertilizers using correct methods - Identify nutrient deficiency symptoms in crop samples. - Prepare organic manure/compost	Guide students to - Demonstrate fertilizer application techniques in field - Apply fertilizers correctly - Prepare and use compost - Provide	Farm plots, fertilizers, manure, hoes, watering cans, charts, Practical manual

	4.5 Describe symptoms of nutrient deficiency in crops 4.6 Explain soil amendment practices.	using diagrams • Discuss nutrient deficiency symptoms in crops • Discuss nutrient management in relation to yield improvement	manure samples, deficiency, etc.	• Apply organic manure/compost • Calculate simple fertilizer application rates.	samples/images for deficiency identification • Calculate simple fertilizer	
General Objective 5.0: Know soil sampling, testing and analysis						
9 – 10	5.1 Explain the importance of soil sampling in agricultural production 5.2 Explain methods of soil sampling. 5.3 Explain procedures for proper soil sample collection and handling 5.4 Explain basic soil testing methods for parameters (pH, texture, organic matter, etc.). 5.5 Explain interpretation of soil test results for nutrient management 5.6 Describe simple soil testing kits and their uses	• Discuss the importance of soil sampling using crop yield examples • Discuss different sampling methods using diagrams and field layout • Explain step-by-step procedure for collecting soil samples • Explain how poor sampling affects test results • Discuss basic soil testing methods for some parameters (e.g., pH testing, etc). • Explain interpretation using sample test results.	Textbooks, Journals, Internet, Projector, Diagrams/charts, Marker board, Marker, Soil, sampling tools, Soil test kits, etc.	• Observe safety measures for field and laboratory activities. • Collect soil samples using correct methods • Carry out labelling and handling of soil samples properly • Perform simple soil tests using kits • Record basic soil test results • Perform analysis and interpretation of basic soil test results • Recommend suitable soil improvement practices based on the results	Guide students to: • Observe safety measures for field and laboratory activities. • Demonstrate soil sampling in selecting sampling points and depth • Label and handle samples • Use soil test kits • Interpret results	Soil auger/spade, sample bags, soil test kits, farm plot, notebooks, Practical manual

General Objective 6.0: Appreciate the application of soil and water conservation techniques						
11 – 13	6.1.Explain causes and types of soil erosion. 6.2.Describe effects of soil erosion on agricultural productivity 6.3.Explain soil conservation methods 6.4.Describe water conservation techniques 6.5.Explain importance of soil and water conservation in sustainable agriculture 6.6.Describe land management practices that prevent degradation	• Explain causes and types of erosion using local concepts • Discuss the effects of soil erosion on agricultural productivity • Explain how erosion reduces soil fertility and crop yield • Discuss conservation methods using practical illustrations • Explain conservation practices in relation to farmers' real challenges	Textbooks, Journals, Internet, Articles, Projector, Diagrams/charts, Marker board, Marker, Case examples, Field illustrations, Videos, etc.	• Identify erosion types on farm or school environment • Carry out simple soil conservation practices • Demonstrate basic drainage or water control methods • Apply cover materials to reduce erosion • Record observations of conservation practices and their effects	Guide students to • Observe erosion features on the field. • Demonstrate mulching and contouring step-by-step • Mark contour lines and apply materials • Carry out conservation methods	Farm plots, hoes, organic materials (mulch), pegs, ropes, Practical manual
General Objective 7.0: Know the application of digital tools in land and soil management						
14 – 15	7.1 Explain the roles of digital technologies in soil and land management 7.2 Describe basic tools used in digital agriculture 7.3 Explain how digital tools support soil sampling, fertilizer application and land planning	• Explain digital agriculture concepts using local relevance • Describe GPS, drones (where available) and mobile apps used in agriculture • Explain how digital tools improve decision-making (soil testing, mapping, etc.) • Explain step-by-step	Textbooks, Journals, Internet, Projector, Diagrams/charts, Marker board, Marker, Smartphones, GPS device,	• Use mobile apps to access soil and weather information • Demonstrate basic GPS and drones (where available) location tracking on farm • Record simple land or soil data using mobile devices • Interpret digital	Guide students to • Use mobile applications • Use GPS and drones (where available) to track location on farm • Carry out data recording activities • Interpret	Smartphones, GPS devices, mobile apps, internet Drones, Practical manual

	7.4 Describe use of mobile applications for soil information, weather data and advisory services 7.5 Explain benefits and limitations of digital tools in agriculture	use of simple digital tools	Drones Charts, etc.	information for basic farm decisions • Use simple digital advisory tools	information obtained	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						



MODERN ANIMAL PRODUCTION AND ONE HEALTH SYSTEMS

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: MODERN ANIMAL PRODUCTION AND ONE HEALTH SYSTEMS	COURSE CODE: AGT 113	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with skills and knowledge in animal production, management practices, and One Health principles for sustainable livestock production and improved public health.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand principles and scope of animal production and One Health; 2.0 Know the classification of farm animals and their characteristics; 3.0 Apply animal nutrition and feeding practices; 4.0 Apply livestock housing and management techniques; 5.0 Identify common animal diseases and apply preventive health measures; 6.0 Apply sustainable and biosecurity practices in animal production.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: MODERN ANIMAL PRODUCTION AND ONE HEALTH SYSTEMS			COURSE CODE: AGT 113	CONTACT HOURS: 4 HOURS/WEEK		
			CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: I			PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with practical skills and knowledge in animal production, management practices, and One Health principles for sustainable livestock production and improved public health.						
GENERAL OBJECTIVE 1.0: Understand principles and scope of animal production and One Health						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define animal production 1.2 Explain the importance of animal production in agriculture 1.3 Describe major classes of farm animals 1.4 Explain roles of livestock in food production, income, employment, etc. 1.5 Explain the concept of One Health (link between animal, human and environmental health) 1.6 Describe basic principles of animal	• Discuss importance of animal production and classify major classes of farm animals • Discuss livestock production in relation to food security and income • Explain One Health using real-life examples (zoonotic diseases, etc.) • Discuss animal-human-environment relationships	Textbooks, Journals, Internet, Projector, Diagrams/charts, Marker board, Marker etc.	• Carry out field trip to nearby Farm or livestock market • Identify common farm animals in the school or community • Observe characteristics of different livestock species • Identify management systems used • Identify examples of One Health interactions (animal–human–environment)	Guide students to: • Carry out field trip to nearby Farm/livestock market • Identify common farm animals in the school/community • Observe characteristics of different livestock species • Identify management systems used • Identify examples of One	Farm animals, pictures, farm environment, practical manual

	production systems				Health interactions (animal–human–environment)	
General Objective 2.0: Know the classification of farm animals and their characteristics						
3 - 5	2.1 Explain the classification of major farm animal species 2.2 Describe distinguishing characteristics of different animal groups 2.3 Explain the classification of animals based on digestive systems and uses 2.4 Describe basic anatomy of farm animals 2.5 Explain breeds of common livestock and their characteristics 2.6 Describe behavioural characteristics of farm animals relevant to management	• Discuss the classification of major farm animal species • Discuss distinguishing characteristics of different animal groups • Discuss the classification of animals based on digestive systems and uses • Describe basic anatomy of farm animals • Explain breeds of common livestock and their characteristics • Describe behavioural characteristics of farm animals relevant to management	Textbooks, Journals, Internet, Articles, Projector, Diagrams/charts, Marker board, Marker, Animal models, Live animals etc.	• Identify different farm animals and breeds • Observe external body parts of animals • Carry out examination to differentiate between ruminants and non-ruminants • Classify animals based on uses • Observe animal behaviour • Write a technical report on Field trip(s) to nearby Farm or livestock market, etc.	Guide students to: • Identify different farm animals and breeds • Observe external body parts of animals • Differentiate between ruminants and non-ruminants • Classify animals based on uses • Observe animal behaviour • Write a technical report on Field trip(s) to nearby Farm or livestock market, etc.	Livestock unit, animals, charts, models, notebook, Practical manual.
General Objective 3.0: Know animal nutrition and feeding practices						

6 – 8	3.1 Explain the concept of animal nutrition and importance in livestock production 3.2 State classes of feed nutrients and their functions 3.3 Describe types of feeds and their sources 3.4 Explain feeding systems for different livestock 3.5 Describe feed formulation principles for different animals 3.6 Explain effects of poor nutrition on animal health and productivity	• Explain animal nutrition using simple feeding examples from local farms • Discuss different feed materials and explain their nutrient content • Explain nutrient functions and deficiencies • Explain feeding systems using diagrams and real-life practices • Explain feed formulation using simple ratios and examples • Explain feeding practices in relation to animal growth and productivity	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Feed samples, etc.	• Identify different feed types • Measure simple feed ingredients. • Prepare simple feed rations • Feed animals using appropriate methods • Observe feeding behaviour of livestock • Calculate simple feed requirements for selected animals	Guide students to: • Identify different feed types • Measure simple feed ingredients. • Prepare simple feed rations • Feed animals using appropriate methods • Observe feeding behaviour of livestock • Calculate simple feed requirements for selected animals	Feed materials, weighing scale, feeding troughs, livestock, Practical manual.
General Objective 4.0: Understand livestock housing and management techniques						
9 – 10	4.1 Explain importance of livestock housing in animal production 4.2 Describe types of livestock housing systems 4.3 Explain factors to consider in housing design	• Explain housing concepts using examples from local farms • Explain different housing structures • Compare good vs poor housing	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker	• Carry out field trip(s) to livestock housing units for observation • Identify different livestock housing systems in the farm • Maintain animal housing units	Guide students to: • Carry out field trip(s) to livestock housing units for observation • Identify different livestock housing systems in the	Livestock housing units, cleaning tools, feeding equipment, animals, Practical manual

	4.4 Describe housing requirements for different livestock 4.5 Explain routine management practices 4.6 Describe equipment used in livestock housing and their functions	conditions and their effects • Describe layout and design considerations (ventilation, spacing, etc). • Explain daily management routines • Describe housing in relation to animal health and productivity	board, Marker, Farm structures etc.	• Arrange feeding and watering equipment properly • Practice safe handling and movement of animals • Demonstrate waste disposal and sanitation procedures • Write a technical report	farm • Maintain animal housing units • Arrange feeding and watering equipment properly • Practice safe handling and movement of animals • Demonstrate waste disposal and sanitation procedures • Write a technical report	
General Objective 5.0: Know common animal diseases and apply preventive health measures						
11 – 13	5.1 Explain the concept of animal health and disease in livestock production 5.2 Identify common livestock diseases (bacterial, viral, parasitic) affecting cattle, poultry, goats, etc. 5.3 Describe symptoms and modes of transmission of common diseases 5.4 Explain preventive	• Explain animal health using real farm examples • Explain disease symptoms using charts/pictures • Discuss common diseases in local livestock systems • Explain disease transmission using simple illustrations • Explain preventive	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, veterinary materials etc.	• Identify visible symptoms of diseases in animals or images • Practice basic animal health care (cleaning, isolation of sick animals, etc.) • Measure vital body parameters in animals before administration of drugs/treatments • Carry out simple biosecurity measures	Guide students to: • Identify visible symptoms of diseases in animals or images • Practice basic animal health care (cleaning, isolation of sick animals, etc.) • Measure vital body parameters in animals before	Livestock unit, charts, veterinary kits, disinfectants

	measures 5.5 Describe zoonotic diseases and their implications under One Health 5.6 Explain basic animal health management practices and routine care	measures (vaccination schedules, hygiene practices, etc). • Explain zoonotic diseases linking animals and humans		(footbath, hygiene, etc). • Observe animal health conditions • Participate in vaccination or simulated procedures (where possible)	administration of drugs/treatments • Carry out simple biosecurity measures (footbath, hygiene, etc). • Observe animal health conditions • Participate in vaccination or simulated procedures (where possible)	
General Objective 6.0: Know the application of sustainable and biosecurity practices in animal production						
14 - 15	6.1 Explain the concept of biosecurity in livestock production. 6.2 Outline the importance of biosecurity in livestock production. 6.3 Describe common biosecurity measures. 6.4 Explain waste management practices in animal production. 6.5 Describe sustainable livestock practices. 6.6 Explain environmental impacts of livestock	• Explain biosecurity using real-life disease outbreak examples • Discuss biosecurity measures using diagrams and farm practices • Explain proper waste management techniques (manure handling, composting) • Explain sustainability in relation to environmental protection and farm	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Farm examples, etc.	• Carry out biosecurity measures (use of footbath, cleaning, restricted access, etc). • Practice proper waste handling and disposal methods • Identify biosecurity risks in a livestock unit • Apply simple sanitation and disinfection practices • Participate in environmental management	Guide students to: • Carry out biosecurity measures (use of footbath, cleaning, restricted access, etc). • Practice proper waste handling and disposal methods • Identify biosecurity risks in a livestock unit • Apply simple	Livestock unit, disinfectants, cleaning tools, waste materials, practical manual.

	production and mitigation measures.	efficiency • Discuss animal welfare and ethical practices		activities • Write a technical report on field trip(s) to farms to assess biosecurity measures.	sanitation and disinfection practices • Participate in environmental management activities • Write a technical report on field trip(s) to farms to assess biosecurity measures.	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ICT APPLICATIONS IN AGRICULTURE

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ICT APPLICATIONS IN AGRICULTURE	COURSE CODE: AGT 114	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in digital competencies of modern agricultural production systems.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand ICT fundamentals and their applications in agriculture; 2.0 Understand basic computer operations and data handling; 3.0 Understand the application of digital tools for farm record keeping and agricultural communication; 4.0 Understand the application of ICT tools for data analysis and decision-making in agriculture; 5.0 Know the use of mobile, digital and precision technologies in agriculture; 6.0 Know safe, ethical and responsible use of ICT tools.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ICT APPLICATIONS IN AGRICULTURE			COURSE CODE: AGT 114		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in digital competencies of modern agricultural production systems.						
GENERAL OBJECTIVE 1.0: Understand ICT fundamentals and their applications in agriculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Explain the meaning and components of ICT (hardware, software, network, etc). 1.2 Describe types of ICT devices used in agriculture (computers, mobile devices, sensors, drones, etc). 1.3 Explain functions of major computer components (input, processing, storage, output, etc.). 1.4 Explain applications of ICT in agriculture (precision farming, weather services, farm records, extension	• Explain ICT concepts using simple definitions and relate them to agricultural activities • Discuss real computer components and their functions • Explain the use of ICT tools such as mobile phones for market and weather information • Describe the link of ICT tools to farm operations	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, etc.	• Identify computer hardware components • Carry out proper handling of ICT devices • Perform system start-up and shutdown procedures • Identify ICT tools used in agriculture. • Use ICT tools to search for market and weather information	Guide students to: • Identify computer hardware components • Carry out proper handling of ICT devices • Perform system start-up and shutdown procedures • Identify ICT tools used in agriculture. • Use ICT tools to search for market and weather information	Desktop/laptop computers, mobile phones, ICT devices, Practical manual, etc.

	communication, marketing, etc.)					
General Objective 2.0: Understand basic computer operations and data handling						
3 - 4	2.1 Explain basic computer operations (start-up, shutdown, navigation) 2.2 Describe operating system functions and interface (desktop, icons, menus, etc). 2.3 Explain file management (create, save, retrieve, organize folders, etc). 2.4 Explain principles of accurate data entry and formatting.	• Explain step-by-step computer start-up and shutdown procedures • Explain operating system interface using live computer display • Explain files and folders creation saving and organisation • Discuss the importance of accuracy in agricultural data entry	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, etc.	• Perform computer start-up and shutdown operations • Carry out tasks to create, save, copy, and organize files and folders • Use word processor or spreadsheet to format simple data. • Practice typing and editing basic agricultural information using word processor or spreadsheet.	Guide student to: • Perform computer start-up and shutdown operations • Carry out tasks to create, save, copy, and organize files and folders • Use word processor or spreadsheet to format simple data. • Practice typing and editing basic agricultural information using word processor or spreadsheet.	Desktop/laptop computers, word processor, spreadsheet software, Practical manual etc.
General Objective 3.0: Understand the application of digital tools for farm record keeping and agricultural communication						
5 – 7	3.1 Explain types of farm records (production, financial, labour, input/output, etc.) 3.2 Describe digital tools	• Use real farm scenarios to explain record types • Describe spreadsheet structure and usage	Textbooks, Journals, Internet, Articles, Projector,	• Create simple farm records (yield, labour, expenses, etc). using spreadsheet	Guide students to: • Create simple farm records (yield, labour, expenses, etc).	Computers, spreadsheet software, smartphones, internet,

	for farm record keeping (spreadsheets, mobile apps, etc). 3.3 Explain importance of accurate record keeping in farm management 3.4 Explain ICT tools for agricultural communication (email, SMS, mobile apps, extension platforms, etc).	• Explain consequences of poor record keeping • Describe communication tools using real-life examples	Computer, Diagrams/charts, Marker board, Marker, Picture, sample farm records, etc.	• Record farm data digitally • Receive agricultural information via email and mobile apps • Simulate farmer-extension communication	using spreadsheet • Record farm data digitally • Receive agricultural information via email and mobile apps • Simulate farmer-extension communication	Practical manual, etc.
General Objective 4.0: Understand the application of ICT tools for data analysis and decision-making in agriculture						
8 – 10	4.1 Explain basic data analysis concepts (totals, averages, percentages, etc). 4.2 Describe importance of data in agricultural decision-making 4.3 Explain simple farm calculations (yield, cost, profit, loss, etc). 4.4 Explain interpretation of agricultural data for planning	• Explain data analysis concepts using real farm data examples • Outline calculations step-by-step • Explain data analysis in relation to farm decisions (profitability, yield improvement, etc).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures Calculators, computers, etc.	• Perform calculations using spreadsheet (yield, cost-benefit analysis, etc). • Analyze farm data and interpret results • Present simple data summaries for decision-making	Guide students to: • Perform calculations using spreadsheet (yield, cost-benefit analysis, etc). • Analyze farm data and interpret results • Present simple data summaries for decision-making	Computers, spreadsheet software, calculator, Practical manual
General Objective 5.0: Know the use of mobile, digital and precision technologies in agriculture						
11 – 13	5.1 Explain mobile agriculture applications (weather, market, advisory apps, etc).	• Explain agricultural mobile apps • Explain GPS and mapping concepts	Textbooks, Journals, Internet, Projector,	• Use mobile apps to access weather and market information • Demonstrate basic	Guide students to • Supervise app usage and field activities	Smartphones, GPS devices, mobile apps, practical

	5.2 Describe GPS and mapping basics in agriculture 5.3 Explain precision agriculture tools and their applications 5.4 Explain role of digital advisory systems in agriculture	using simple illustrations • Explain precision agriculture Relation to modern farming practices • Discuss examples of digital agriculture tools including Artificial Intelligence (AI).	Computer, Diagrams/charts, Marker board, Marker, Pictures, Smartphones, GPS devices, etc.	GPS location tracking • Collect simple farm data using mobile tools • Record simple farm data using mobile tools • Use digital advisory platforms • Use AI in agricultural activities (market, forecast, research, etc.)	• Use GPS for location tracking • Assign tasks for data collection • Validate and correct student outputs • Use AI in agricultural activities (market, forecast, research, etc.)	manual, etc.
General Objective 6.0: Know safe, ethical and responsible use of ICT tools						
14 – 15	6.1 Explain ICT safety (viruses, data loss, misuse, cloud computing, backups, etc) 6.2 Describe data protection and privacy 6.3 Explain ethical use of ICT in agriculture 6.4 Explain cyber security in Agriculture 6.5 Explain safe handling and maintenance of ICT equipment	• Discuss real-life cases of data loss and misuse • Explain importance of data protection and privacy • Explain ethical use of ICT tools	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	• Perform safe file storage and password protection • Practice proper handling of ICT devices • Use external hard drive to store information • Identify unsafe practices and correct them	Guide students to: • Subscribe and install internet security on devices • Use external drive to store information • Demonstrate safe practices • Correct improper handling	Computers, storage devices, practical manual, etc.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	100%



FARM WOODLAND AND ENVIRONMENTAL MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: FARM WOODLAND AND ENVIRONMENTAL MANAGEMENT	COURSE CODE: AGT 115	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with skills and knowledge in farm woodland establishment, management, and sustainable environmental practices for improved agricultural productivity and ecological balance.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand principles of farm woodland and environmental management; 2.0 Understand the classification of forest trees and agroforestry systems; 3.0 Know the techniques for nursery establishment and tree propagation; 4.0 Understand the establishment and management of farm woodlots and agroforestry systems; 5.0 Know environmental conservation and climate-smart practices; 6.0 Understand the management of forest resources sustainably and prevent land degradation;		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: FARM WOODLAND AND ENVIRONMENTAL MANAGEMENT			COURSE CODE: AGT 115		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with skills and knowledge in farm woodland establishment, management, and sustainable environmental practices for improved agricultural productivity and ecological balance.						
GENERAL OBJECTIVE 1.0: Understand principles of farm woodland and environmental management						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Explain the meaning and scope of farm woodland, forestry and environmental management 1.2 Describe the branches of forestry (production, protection, conservation and social forestry) 1.3 Explain the roles and importance of trees in agriculture. 1.4 Describe components of the environment and their interactions 1.5 Explain basic concepts of ecosystem, sustainability and environmental conservation 1.6 Describe causes and	• Explain concepts using familiar local examples of farms and tree use • Break down forestry branches with practical illustrations • Explain ecosystem interactions using diagrams • Explain environmental issues in relation to local community practices (e.g., bush burning, deforestation, etc.)	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	• Identify components of the environment within the institution or community. • Identify the roles of trees on farmland • Identify signs of environmental degradation • Record observations of environmental features and tree functions	Guide students to: • Identify components of the environment within the institution or community. • Identify the roles of trees on farmland • Identify signs of environmental degradation • Record observations of environmental features and tree functions	School environment, farm plots, nearby community, notebooks, practical manual, etc.

	effects of environmental degradation.	- Engage students through questioning and discussion - Explain consequences of poor environmental management				
General Objective 2.0: Understand the classification of forest trees and agroforestry systems						
3 - 5	2.1 Explain common forest and economic tree species found in Nigeria 2.2 Describe characteristics used in tree identification (leaf type, bark texture, stem, seeds, canopy shape, etc.) 2.3 Explain the classification of trees based on uses (timber, medicinal, fruit, shade, fuelwood, environmental protection, etc.) 2.4 Explain agroforestry systems (taungya, alley cropping, shelterbelts, windbreaks, etc.) 2.5 Describe the importance of agroforestry in sustainable agriculture	- Discuss common forest and economic tree species found in Nigeria - Describe characteristics used in tree identification (leaf type, bark texture, stem, seeds, canopy shape, etc.) - Explain trees based on uses (timber, medicinal, fruit, shade, fuelwood, environmental protection, etc.) - Discuss agroforestry	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Tree samples (leaves, seeds) Farm layout illustrations etc.	- Identify common tree species in the school or community - Observe physical characteristics of trees (leaves, bark, height, canopy, etc.) - Carry out field activities to classify trees based on their uses and functions - Identify agroforestry practices on demonstration plots or nearby farms - Record observations of tree species and their uses	Guide students to: - Identify common tree species in the school or community - Observe physical characteristics of trees (leaves, bark, height, canopy, etc.) - Carry out field activities to classify trees based on their uses and functions - Identify agroforestry practices on demonstration plots or nearby farms	Farm environment, botanical garden, tree samples, field plots, notebooks, Practical manual.

	and environmental conservation	systems (taungya, alley cropping, shelterbelts, windbreaks, etc.) • Discuss the importance of agroforestry in sustainable agriculture and environmental conservation			• Record observations of tree species and their uses	
General Objective 3.0: Know the techniques for nursery establishment and tree propagation						
6 – 8	3.1 Explain types and functions of forest nurseries 3.2 Describe criteria for nursery site selection 3.3 Explain nursery layout and seedbed preparation techniques 3.4 Explain media preparation and their ratio 3.5 Explain methods of tree propagation and their suitability 3.6 Describe nursery management practices 3.7 Explain seed selection, treatment (soaking, scarification) and storage methods	• Discuss types and functions of forest nurseries • Describe criteria for nursery site selection • Discuss nursery layout and seedbed preparation techniques • Discuss media preparation and their ratio • Discuss methods of tree propagation and their suitability • Describe nursery management practices	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Seeds, Nursery tools, etc.	• Select appropriate site and clear area for nursery establishment • Prepare seedbeds (raising, leveling, spacing, etc.) • Carry out seed sowing and vegetative propagation (cuttings/grafting where possible) • Carry out potting media preparation • Apply water and shade to nursery beds • Monitor seedling growth and survival rate	Guide students to: • Select appropriate site and clear area for nursery establishment • Prepare seedbeds (raising, leveling, spacing, etc.) • Carry out seed sowing and vegetative propagation (cuttings/grafting where possible) • Carry out potting media preparation • Apply water and	Nursery site, watering cans, hoes, cutlasses, seeds, shading materials, practical manual, etc.

		• Describe seed selection, treatment (soaking, scarification) and storage methods		• Record seedling growth and survival rate.	shade to nursery beds • Monitor seedling growth and survival rate • Record seedling growth and survival rate.	
General Objective 4.0: Understand the establishment and management of farm woodlots and agroforestry systems						
9 – 10	4.1 Explain methods of establishing woodlots and agroforestry systems 4.2 Describe spacing, alignment and layout techniques (square, rectangular, contour planting, etc) 4.3 Explain selection of tree species based on purpose (timber, shade, windbreak, soil improvement, etc) 4.4 Describe management practices 4.5 Explain integration of trees with crops (alley cropping, shelterbelts, etc)	• Discuss methods of establishing woodlots and agroforestry systems • Describe spacing, alignment and layout techniques (square, rectangular, contour planting, etc) • Discuss selection of tree species based on purpose (timber, shade, windbreak, soil improvement, etc) • Describe management practices • Discuss integration of trees with crops	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Measuring tools, etc.	• Calculate plant population based on recommended spacing • Measure out planting area using pegs and tape • Plant tree seedlings at correct spacing and alignment • Perform pruning and thinning on existing trees • Establish simple agroforestry arrangement (tree + crop)	Guide students to: • Calculate plant population based on recommended spacing • Measure out planting area using pegs and tape • Plant tree seedlings at correct spacing and alignment • Perform pruning and thinning on existing trees • Establish simple agroforestry arrangement (tree + crop)	Farm plots, seedlings, pegs, ropes, measuring tape, practical manual, etc.

		(alley cropping, shelterbelts, etc)				
General Objective 5.0: Understand the environmental conservation and climate-smart practices						
11 – 13	5.1 Explain environmental conservation practices (afforestation, reforestation, erosion control etc) 5.2 Describe causes and effects of climate change on agriculture (rainfall variability, drought, flooding etc) 5.3 Explain climate-smart agricultural practices (mulching, agroforestry, water conservation etc) 5.4 Describe soil and water conservation techniques (terracing, contouring, cover cropping etc) 5.5 Explain importance of biodiversity conservation in farming systems	• Discuss environmental conservation practices (afforestation, reforestation, erosion control etc) • Describe causes and effects of climate change on agriculture (rainfall variability, drought, flooding etc) • Discuss climate-smart agricultural practices (mulching, agroforestry, water conservation etc) • Describe soil and water conservation techniques (terracing, contouring, cover cropping etc) • Discuss importance of biodiversity conservation in farming systems	Textbooks, Journals, Internet, Projector, Computer, Diagrams, Charts, Marker board, Marker, Pictures, Case studies, etc.	• Identify erosion and degraded areas within school/farm/community • Construct simple erosion control measures (mulching, contour lines etc) • Plant trees for conservation purposes • Observe different plant species (biodiversity)	Guide students to: • Identify erosion and degraded areas within school/farm/community • Construct simple erosion control measures (mulching, contour lines etc) • Plant trees for conservation purposes • Observe different plant species (biodiversity)	Farm plots, tree seedlings, hoes, organic materials, practical manual.

General Objective 6.0: Understand the management of forest resources sustainably and prevent degradation						
14 – 15	6.1 Explain principles of sustainable forest management 6.2 Describe causes of forest degradation (deforestation, bush burning, illegal logging etc.) 6.3 Explain forest protection methods (fire control, afforestation, controlled grazing, regulations etc.) 6.4 Describe community participation and policies in forest management	• Use real-life examples of forest degradation in Nigeria • Explain consequences of poor forest management • Discuss community roles in protecting forests • Use case studies to explain successful forest management	Textbooks, Journals, Internet, Projector, Diagrams, Charts, Marker board, Marker, Pictures, Case studies.	• Identify signs of forest degradation in field (burnt areas, erosion, tree loss) • Carry out simple firebreak construction • Participate in environmental protection activities (tree planting, clearing fire lines) • Prepare simple report on observed environmental issues	Guide students to: • Identify signs of forest degradation in field (burnt areas, erosion, tree loss) • Carry out simple firebreak construction • Participate in environmental protection activities (tree planting, clearing fire lines) • Prepare simple report on observed environmental issues	Field environment, tools, demonstration plots, practical manual, etc.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						



APPLIED CROP PRODUCTION AND FIELD TECHNIQUES

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: APPLIED CROP PRODUCTION AND FIELD TECHNIQUES	COURSE CODE: AGT 121	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with skills and knowledge in crop production, field operations, and modern crop management techniques for improved agricultural productivity and sustainability.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand land preparation and planting techniques; 2.0 Understand crop establishment and field management practices; 3.0 Know soil fertility and nutrient management techniques; 4.0 Know weed, pest and disease control measures; 5.0 Understand harvesting and post-harvest handling techniques; 6.0 Understand climate-smart and sustainable crop production practices.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: APPLIED CROP PRODUCTION AND FIELD TECHNIQUES			COURSE CODE: AGT 121		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with skills and knowledge in crop production, field operations, and modern crop management techniques for improved agricultural productivity and sustainability.						
GENERAL OBJECTIVE 1.0: Understand land preparation and planting techniques						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Explain methods of land preparation 1.2 Describe stages of land preparation 1.3 Explain factors influencing land preparation 1.4 Describe different planting methods 1.5 Explain spacing, planting depth and seed rate for selected crops.	• Explain land preparation methods (manual, animal traction, mechanised) • Discuss stages of land preparation • Demonstrate differences between planting methods • Explain spacing and depth in relation to crop performance	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Farm Tools, Seeds, Power Tillers, Tractors And Implements, etc.	• Prepare land using modern methods and tools • Carry out ploughing, ridging and bed preparation. • Measure correct spacing using rope/tape • Plant seeds using appropriate method and depth • Establish crop plots for selected crops	Guide students to: • Prepare land using modern methods and tools • Demonstrate ploughing, ridging and bed preparation. • Measure correct spacing using rope/tape • Plant seeds using appropriate method and depth • Establish crop plots for selected crops	Farm plot, hoes, cutlasses, measuring tape, seeds, Power tillers, Tractors and implements, practical manual
General Objective 2.0: Understand crop establishment and field management practices						
3 – 5	2.1 Explain germination and factors affecting	• Discuss germination and factors affecting	Textbooks, Journals,	• Raise nursery and transplant	Guide students to: • Raise nursery and	Farm plot, seedlings,

	seedling establishment 2.2 Describe methods of crop establishment 2.3 Explain thinning, supply and mulching practices 2.4 Describe irrigation methods and their importance 2.5 Explain intercultural operations 2.6 Explain the importance of proper field management in crop productivity	seedling establishment - Describe methods of crop establishment - Describe thinning, supply and mulching practices - Discuss irrigation methods and their importance - Discuss intercultural operations (weeding, staking, pruning) - Discuss the importance of proper field management in crop productivity	Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Seedlings, Irrigation Illustrations, etc.	seedlings - Perform thinning and supply operations - Apply mulching using available materials - Carry out irrigation using available methods - Perform intercultural operations (weeding, staking, pruning) - Maintain crops stand in field plots	transplant seedlings - Perform thinning and supply operations - Apply mulching using available materials - Carry out irrigation using available methods - Perform intercultural operations (weeding, staking, pruning) - Maintain crops stand in field plots	watering cans/irrigation tools, mulch materials, stakes, practical manual, etc.
General Objective 3.0: Know soil fertility and nutrient management techniques						
6 – 8	3.1 Explain soil fertility concepts and essential plant nutrients 3.2 Explain sources of plant nutrients 3.3 Describe types of fertilizers 3.4 Explain methods of fertilizer application 3.5 Explain timing and rate of fertilizer application for	- Discuss soil fertility concepts and essential plant nutrients (macro and micronutrients) - Discuss sources of plant nutrients - Explain types of fertilizers (straight, compound, organic manure, etc.) - Describe methods of	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures Fertilizer Samples, Compost, etc.	- Identify fertilizer types (organic and inorganic) - Measure fertilizers using correct methods - Apply fertilizers using correct methods - Prepare organic manure/compost - Apply organic	Guide students to: - Identify fertilizer types (organic and inorganic) - Measure fertilizers using correct methods - Apply fertilizers using correct methods - Prepare organic manure/compost - Apply organic manure/compost - Demonstrate side	Fertilizers, measuring containers, compost materials, farm plot, practical manual, etc.

	selected crops 3.6 Describe soil fertility management practices 3.7 Explain environmental effects of improper fertilizer use	fertilizer application (broadcasting, band placement, side dressing, foliar application, etc.) • Discuss timing and rate of fertilizer application for selected crops • Describe soil fertility management practices (crop rotation, cover cropping, green manuring, etc.) • Discuss environmental effects of improper fertilizer use		manure/compost • Demonstrate side dressing and band placement techniques • Observe crop response to fertilizer application • Record fertilizer application practices and results	dressing and band placement techniques • Observe crop response to fertilizer application • Record fertilizer application practices and results	
General Objective 4.0: Know weed, pest and disease control measures						
9 – 11	4.1 Define weeds, pests and diseases in crop production 4.2 Explain common weeds found in crop fields (broadleaf, grasses, sedges, etc.) 4.3 Describe characteristics and classification of weeds	• Explain common weeds, pests and diseases in crop production using examples • Discuss the characteristics and classification of weeds into broadleaf, grasses and sedges using live samples • Discuss pest and	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Weed Samples, Pest/Disease Samples, Charts,	• Identify weeds, pests and diseases in field plots • Create weed album and insect box • Carry out manual and mechanical weed control • Apply agrochemicals using recommended	Guide students to: • Identify weeds, pests and diseases in field plots • Create weed album and insect box • Carry out manual and mechanical weed control • Apply agrochemicals using recommended procedures	Farm plot, hoes, cutlasses, sprayers, agrochemicals, PPE (gloves, boots, masks), record sheets, Insect Box, Insect Atlas, Disease Atlas, Digital resources,

	4.4 Explain common crop pests (insects, rodents, birds, etc.) and diseases affecting crops 4.5 Explain types of crop damage caused by pests and diseases 4.6 Describe methods of weed control 4.7 Explain pest and disease control methods (cultural, biological, chemical, Integrated Pest Management (IPM)) 4.8 Explain safe handling and application of agrochemicals 4.9 Describe environmental and health effects of improper pesticide use	disease damage using affected crop samples • Describe different control methods using charts and examples • Discuss IPM concept with practical scenarios • Explain safe handling of agrochemicals and use of PPE	Agrochemical Containers, PPE, etc.	procedures • Demonstrate calibration and use of knapsack sprayer • Apply pest and disease control measures on crops • Observe pest/disease. • Record the incidence. • Use PPE during chemical application • Practice safe handling, storage and disposal of agrochemicals	• Demonstrate calibration and use of knapsack sprayer • Apply pest and disease control measures on crops • Observe pest/disease. • Record the incidence. • Use PPE during chemical application • Practice safe handling, storage and disposal of agrochemicals	Practical manual
General Objective 5.0: Understand harvesting and post-harvest handling techniques						
12 – 13	5.1 Explain the concept and importance of harvesting in crop production	• Discuss harvesting concepts and importance using real crop examples	Textbooks, Journals, Internet, Projector,	• Identify maturity stage of selected crops in the field • Harvest crops	Guide students to: • Identify maturity stage of selected crops in the field	Farm produce, knives, baskets, packaging materials,

5.2 Describe maturity indices for different crops (grains, vegetables, fruits, roots and tubers, etc.) 5.3 Describe appropriate harvesting methods for different crops (manual and mechanical) 5.4 Explain factors affecting harvesting time (weather, market demand, crop type, etc.) 5.5 Describe post-harvest handling operations 5.6 Explain causes of post-harvest losses 5.7 Describe methods of reducing post-harvest losses 5.8 Explain basic storage methods for agricultural produce (traditional and modern) 5.9 Explain quality control and food	• Discuss maturity indices using samples (e.g., maize, tomato, cassava) • Discuss harvesting methods for different crops • Explain post-harvest operations using charts • Discuss factors affecting harvesting time (weather, market demand, crop type, etc.) • Discuss causes of losses and prevention strategies • Explain sorting, grading and packaging techniques	Computer, Diagrams/charts, Marker board, Marker, Pictures, Crop Samples, Storage Materials, Packaging Materials, etc.	using appropriate methods and tools • Sort produce • Clean produce • Grade harvested produce • Package produce using suitable materials • Store produce using appropriate storage methods • Identify post-harvest losses during handling • Observe quality changes during storage • Record quality changes during storage	• Harvest crops using appropriate methods and tools • Sort produce • Clean produce • Grade harvested produce • Package produce using suitable materials • Store produce using appropriate storage methods • Identify post-harvest losses during handling • Observe quality changes during storage • Record quality changes during storage	storage facilities, practical manual.
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	safety considerations in post-harvest handling					
General Objective 6.0: Understand climate-smart and sustainable crop production practices						
14 – 15	6.1 Explain the concept of climate change and its effects on crop production 6.2 Describe Climate-Smart Agriculture (CSA) principles and practices 6.3 Explain adaptation strategies in crop production 6.4 Explain sustainable land management practices 6.5 Describe water conservation techniques in crop production 6.6 Explain the importance of environmental protection in agriculture 6.7 Describe basic risk management strategies in crop production	• Discuss the concept of climate change and its effects on crop production (drought, flooding, temperature variation etc.) • Describe climate-smart agriculture (CSA) principles and practices • Discuss adaptation strategies in crop production (use of improved varieties, planting dates, irrigation, mulching) • Discuss sustainable land management practices (crop rotation, cover cropping, conservation tillage etc.) • Describe water conservation	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Weather Data, Mobile Apps, Farm Examples, etc.	• Apply mulching and water conservation techniques on field plots • Practice crop rotation and/or intercropping on demonstration plots • Adjust planting schedules based on simulated weather data • Demonstrate the use of improved/adapted crop varieties • Use mobile tools (where available) to access weather/agric advisory information • Identify climate risks affecting field crops and	Guide students to: • Apply mulching and water conservation techniques on field plots • Practice crop rotation and/or intercropping on demonstration plots • Adjust planting schedules based on simulated weather data • Demonstrate the use of improved/adapted crop varieties • Use mobile tools (where available) to access weather/agric advisory information • Identify climate risks affecting field crops and propose mitigation strategies • Maintain sustainable practices on field plots	Farm plot, mulch materials, improved seeds, mobile devices, weather information, practical manual

	6.8 Explain the role of digital tools in climate-smart agriculture	techniques in crop production • Discuss the importance of environmental protection in agriculture • Discuss basic risk management strategies in crop production (early warning, diversification etc.) • Explain the role of digital tools (weather apps, advisory services) in climate-smart agriculture		propose mitigation strategies • Maintain sustainable practices on field plots		
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

SOIL FERTILITY AND LAND MANAGEMENT PRACTICES

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: SOIL FERTILITY AND LAND MANAGEMENT PRACTICES	COURSE CODE: AGT 122	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with skills and knowledge in soil fertility management and sustainable land use practices for improved crop production and environmental conservation.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand soil fertility and soil properties; 2.0 Understand soil fertility management techniques; 3.0 Know fertilizers and manure management practices; 4.0 Know soil conservation and land management techniques; 5.0 Understand sustainable soil and land use practices.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: SOIL FERTILITY AND LAND MANAGEMENT PRACTICES			COURSE CODE: AGT 122		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with skills and knowledge in soil fertility management and sustainable land use practices for improved crop production and environmental conservation.						
GENERAL OBJECTIVE 1.0: Understand soil fertility and soil properties						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define soil and soil fertility 1.2 Explain the importance of soil and soil fertility in agriculture 1.3 Describe soil formation processes and factors (parent material, climate, organisms, topography and time) 1.4 Explain soil components 1.5 Describe physical properties of soil 1.6 Explain chemical properties of soil 1.7 Describe biological	• Explain soil concepts using local soil examples • Explain the importance of soil and soil fertility in agriculture • Discuss soil formation and properties using charts and diagrams. • Explain soil texture using simple methods (hand feel method etc.) • Explain soil properties in relation to crop growth and yield • Describe locally	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Soil samples, etc.	• Collect soil samples from different locations • Determine soil texture using hand feel method • Observe soil colour, structure and composition • Perform test to classify soil samples based on observed properties • Record observations of soil characteristics	Guide students to: • Carry out soil samples collection • Determine soil texture • Observe soil colour, structure and composition • Classify soil samples	Soil samples, containers, hand tools, practical manual

	properties of soil 1.8 Explain the relationship between soil properties and crop performance	available soil.				
General Objective 2.0: Understand soil fertility management techniques						
3 - 5	2.1 Explain concept of soil fertility and soil productivity 2.2 Explain the differences between soil fertility and productivity. 2.3 Explain essential plant nutrients (macro: N, P, K; secondary and micronutrients) and their functions 2.4 Describe nutrient deficiency symptoms in major crops. 2.5 Explain soil testing and interpretation of soil test results 2.6 Describe factors affecting nutrient availability 2.7 Explain methods of improving soil fertility. 2.8 Explain liming and soil pH correction 2.9 Describe integrated	• Explain fertility concepts using local soil conditions • Explain nutrient functions and deficiency symptoms using charts. • Display real crop samples showing deficiency signs • Discuss soil testing procedures and interpretation • Explain ISFM using practical farm scenarios.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Soil Samples, Plant Samples, Soil Test Kits, etc.	• Identify nutrient deficiency symptoms on crops in field plots • Collect soil samples using correct sampling procedures • Perform simple soil testing (where available) • Apply organic materials (compost/manure) to improve soil fertility • Demonstrate liming practices for acidic soils • Record soil test results • Interpret soil test results	Guide students to: • Identify nutrient deficiency symptoms on crops in field plots • Collect soil samples using correct sampling procedures • Perform simple soil testing (where available) • Apply organic materials (compost/manure) to improve soil fertility • Demonstrate liming practices for acidic soils • Record soil test results • Interpret soil test results	Soil test kits, compost, lime, farm plot, sample crops Fertilizers, practical manual

	soil fertility management (ISFM) approach					
General Objective 3.0: Know fertilizers and manure management practices						
6 – 8	3.1 Explain the classification of fertilizers into organic and inorganic types. 3.2 Explain common fertilizer formulations and their nutrient composition (e.g., NPK ratios) 3.3 Explain functions of major nutrients (N, P, K) in plant growth 3.4 Describe methods of fertilizer application. 3.5 Explain timing and rate of fertilizers application for different crops 3.6 Describe preparation and management of organic manure (composting process, farmyard manure) 3.7 Explain advantages and limitations of organic and inorganic fertilizers 3.8 Explain environmental risks associated with	• Explain fertilizer and their composition • Describe fertilizer application methods using diagrams and field examples • Explain compost preparation step-by-step • Discuss fertilizer use in relation to crop performance and yield • Discuss environmental implications of fertilizer misuse.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Fertilizer Samples, Compost Materials, etc.	• Identify fertilizer types and formulations. • Measure fertilizers using recommended rates. • Apply fertilizers using appropriate methods on field plots. • Prepare compost using available organic materials. • Apply organic manure to soil. • Observe crop response to fertilizer application. • Record fertilizer application practices	Guide students to: • Identify fertilizer types and formulations. • Measure fertilizers using recommended rates. • Apply fertilizers using appropriate methods on field plots. • Prepare compost using available organic materials. • Apply organic manure to soil. • Observe crop response to fertilizer application. • Record fertilizer application practices	Fertilizers, compost materials, measuring tools, farm plot, practical manual,

	fertilizer misuse (leaching, pollution etc)					
General Objective 4.0: Know soil conservation and land management techniques						
9 – 11	4.1 Define soil erosion and land degradation 4.2 Explain soil erosion and land degradation causes 4.3 Explain types of soil erosion. 4.4 Explain factors influencing erosion 4.5 Describe effects of soil erosion on soil fertility and crop yield 4.6 Explain soil conservation techniques. 4.7 Describe land management practices. 4.8 Explain watershed management principles 4.9 Explain the importance of sustainable land use planning	• Explain erosion using real field examples • Use diagrams to illustrate erosion types and control methods • Discuss contour farming concepts using models • Discuss impact of land degradation on agriculture • Explain conservation practices in relation to local farming systems	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Field examples, etc.	• Identify erosion features on field plots on school farm or nearby community • Practice soil conservation techniques (mulching, contour alignment etc) • Construct simple erosion control structures (bunds, ridges etc) • Apply appropriate land management practices on field plots • Observe effectiveness of conservation measures	Guide students to: • Identify erosion features on field plots on school farm or nearby community • Practice soil conservation techniques (mulching, contour alignment etc) • Construct simple erosion control structures (bunds, ridges etc) • Apply appropriate land management practices on field plots • Observe effectiveness of conservation measures	Farm plot, hoes, mulch materials, measuring tools, practical manual.
General Objective 5.0: Understand sustainable soil and land use practices						
12 – 15	5.1 Explain the concept and importance of sustainable soil	• Explain sustainability concepts using practical farm	Textbooks, Journals, Internet,	• Carry out planning and implementation of crop rotation on field	Guide students to: • Carry out planning and	Farm plot, soil tools, mulch materials, rotation

	management. 5.2 Describe practices that improve soil health 5.3 Explain Integrated Soil Fertility Management (ISFM) and its components 5.4 Describe climate-smart soil management practices. 5.5 Explain role of organic farming in maintaining soil fertility 5.6 Describe environmental impacts of poor land use practices 5.7 Explain the strategies for maintaining long-term soil productivity 5.8 Explain role of modern technologies (GIS, soil sensors, digital tools) in soil management	examples • Describe crop rotation and cover cropping systems • Discuss ISFM approach and its benefits • Describe climate-smart practices using real scenarios • Explain the environmental impacts of poor practices • Describe modern tools for soil management	Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Soil Data, Digital Tools, etc.	plots • Apply mulching and conservation practices • Use simple soil testing tools • Maintain soil conservation structures on field plots • Carry out monitoring and recording of soil management practices • Evaluate effectiveness of sustainable practices over time	implementation of crop rotation on field plots • Apply mulching and conservation practices • Demonstrate use of simple soil testing tools • Maintain soil conservation structures on field plots • Carry out monitoring and recording of soil management practices • Evaluate effectiveness of sustainable practices over time	plans, practical manual,
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ANIMAL PRODUCTION I (MONOGASTRIC)

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ANIMAL PRODUCTION I (MONOGASTRIC)	COURSE CODE: AGT 123	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to provide students with knowledge and skills in the production and management of monogastric animals, specifically poultry, pigs, and rabbits, to enhance food security and economic empowerment.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the types, breeds, and classification of monogastric animals; 2.0 Know the economic importance of monogastric industry; 3.0 Understand housing requirements and equipment for monogastric production; 4.0 Comprehend routine management practices for poultry, pigs, and rabbits; 5.0 Understand the principles of nutrition and feeding for monogastrics; 6.0 Understand health management, biosecurity, and disease control; 7.0 Know the processing, preservation, and marketing of monogastric products; 8.0 Understand the importance of record-keeping in monogastric enterprises.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ANIMAL PRODUCTION I (MONOGASTRIC)			COURSE CODE: AGT 123		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to provide students with fundamental knowledge and practical skills in the production and management of monogastric animals, specifically poultry, pigs, and rabbits, to enhance food security and economic empowerment.						
GENERAL OBJECTIVE 1.0: Understand the types, breeds, and classification of monogastric animals.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define monogastric animals. 1.2 Describe common breeds of poultry, pigs, and rabbits in Nigeria. 1.3 Explain the classification of breeds based on utility.	• Explain monogastric animals. • Describe common breeds of poultry • Discuss the classification of breeds based on utility (e.g., egg-type vs meat-type).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Farm examples, etc.	• Identify different monogastric animals with their common breeds • Observe characteristics of local and exotic breeds • Create slide presentation to classify animals based on production purpose • Record observations	Guide students to: • Identify different monogastric animals with their common breeds • Observe characteristics of local and exotic breeds • Classify animals based on production purpose • Record observations	Live animals, breed charts, LCD projector, breed identification guides, practical manual,
General Objective 2.0: Know the economic importance of monogastric industry.						

3	2.1 Explain the role of monogastrics in the Nigerian economy. 2.2 Describe products and by-products. 2.3 Explain challenges facing the industry.	• Discuss the role of monogastrics in the Nigerian economy. • Explain products and by-products. • Discuss challenges facing the industry.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	• Visit nearby market and monogastric production sites • Identify products and byproducts of different monogastric animals • Identify the challenges facing the industry. • Write technical report on observations.	Guide students to: • Visit nearby market and monogastric production sites • Identify products and byproducts of different monogastric animals • Identify the challenges facing the industry. • Write technical report on observations.	Market survey tools, case studies, basic accounting templates, Practical manual
General Objective 3.0: Understand housing requirements and equipment for monogastric production.						
4 - 5	3.1 Explain site selection criteria. 3.2 Describe housing types 3.3 Explain essential equipment needed in monogastric house.	• Describe site selection criteria. • Describe housing types (Deep litter, battery cage, pig pens, rabbit hutches etc). • Describe essential equipment needed in monogastric house.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures,	• Identify livestock housing structures • Assess livestock housing structures • Maintain animal housing units • Carry out proper waste disposal methods • Organize farm layouts	Guide students to: • Identify livestock housing structures • Assess livestock housing structures • Maintain animal housing	Building materials samples, equipment models, design software/templates, basic carpentry tools, practical manual.

			Farm structures, etc.	• Maintain hygiene in animal housing	units • Demonstrate proper waste disposal methods • Organize farm layouts. • Maintain hygiene in animal housing	
General Objective 4.0: Comprehend routine management practices for poultry, pigs, and rabbits.						
6– 8	4.1 Explain brooding and rearing in poultry. 4.2 Explain the following: i) Sexing ii) Caponizing, iii) Delousing iv) De-beaking v) Culling etc. in poultry management. 4.3 Describe management of piglets (farrowing to weaning). 4.4 Explain rabbit breeding and kindling management.	• Discuss brooding and rearing in poultry. • Discuss the following: i. Sexing ii. Caponizing, iii. Delousing iv. De-beaking v. Culling etc. in poultry management. • Describe management of piglets (farrowing to weaning). • Describe rabbit breeding and kindling management.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Brooders, debeakers, handling crates/cages, etc.	• Practice safe and humane handling and restraint techniques for poultry, pigs, and rabbits. • Setup Brooding • Carry out chick vaccination (simulated), debeaking (simulated/demonstration). • Carry out ear notching, tail docking, teeth clipping, iron injection (simulated) • Carry out sexing, kindling box	Guide students to: • Practice safe and humane handling and restraint techniques for poultry, pigs, and rabbits. • Setup Brooding • Carry out chick vaccination (simulated), debeaking (simulated/demonstration). • Carry out ear notching, tail docking, teeth clipping, iron injection	Brooders, debeakers, handling crates, ear notchers, tail dockers, syringes, iron dextran (simulated), kindling boxes. PPE, practical manual.

				preparation, litter management.	(simulated) • Carry out sexing, kindling box preparation, litter management.	
General Objective 5.0: Understand the principles of nutrition and feeding for monogastrics.						
9 – 10	5.1 Explain common feed ingredients. 5.2 Explain nutrient requirements for different growth stages. 5.3 Explain feeding systems and water management. 5.4 Explain the concept of precision feeding	• Discuss common feed ingredients. • Explain nutrient requirements for different growth stages. • Discuss feeding systems and water management. • Describe the concept of precision feeding	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Feed samples, weighing scales, mixing troughs, etc.	• Identify common feed ingredients. • Identify nutrient requirements for different growth stages • Carry out feed formulation • Test water quality parameters and • Record observations.	Guide students to: • Identify Feed Ingredients, classify various feed ingredients (e.g., maize, soybean meal, fish meal). • Calculate and formulate simple feed rations for different monogastric categories (e.g., broiler starter, layer mash, pig grower). • Practice manual or mechanical feed mixing techniques. • Test water quality	Feed ingredient weighing scales, mixing troughs, feed formulation software/tables, water testing kits, practical manual.

					parameters. •Record observations	
General Objective 6.0: Understand health management, biosecurity, and disease control.						
11 – 12	6.1 Explain signs of good and ill health. 6.2 Explain common diseases of monogastric animals (Viral, Bacterial, Parasitic, etc.) 6.3 Explain basic health parameters and ways of assessing them e.g body weight, body temperature, pulse rate etc. 6.3 Explain vaccination and medication protocols.	• Describe signs of good and ill health. • Explain common diseases of monogastric animals (Viral, Bacterial, Parasitic, etc.) • Discuss basic health parameters and ways of assessing them e.g body weight, body temperature, pulse rate etc. • Explain vaccination and medication protocols.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Drugs, vaccines, syringes, disinfectants. Record books, charts, etc.	• Identify common diseases in monogastrics • Prepare Vaccination Schedule for different monogastric animals • Record daily farm activities • Interpret basic livestock records • Demonstrate biosecurity protocols	Guide students to: • Identify signs of common diseases in monogastrics • Prepare Vaccination Schedule for different monogastric animals • Administer common vaccines (simulated) via different routes (e.g., ocular, subcutaneous, intramuscular) • Set up biosecurity protocols (e.g., footbaths, disinfection procedures). • Practice	Vaccines, syringes, disinfectants, personal protective equipment (PPE), dewormers, sprayers, practical manual.

					deworming and external parasite control methods.	
GENERAL OBJECTIVE 7.0 Know the processing, preservation, and marketing of monogastric products.						
13 - 14	7.1 Describe humane slaughtering and dressing techniques 7.2 Explain egg grading and storage processes 7.3 Explain marketing channels for live and dressed products. 7.4 Explain methods of processing monogastric products.	• Explain bird dressing • Explain how to calculate dressing percentage. • Explain egg candling and grading • Discuss methods of processing monogastric products.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Processing kit, egg candler, packaging materials, etc.	• Demonstrate bird dressing • Calculate dressing percentage • Carry out egg candling and grading	Guide students to: • Carry out hands-on practice of humane slaughters, scalding, defeathering, evisceration, and packaging of poultry products • Carry out egg Grading and Candling • Practice grading eggs by size and quality and candling to check internal quality. • Evaluate the quality of dressed carcasses and eggs.	Processing kit (knives, scalding, plucker), egg candler, weighing scales, packaging materials, market analysis tools, practical manual.

					• Develop a marketing plan for monogastric products, including pricing and distribution.	
GENERAL OBJECTIVE 8.0: Understand the importance of record-keeping in monogastric enterprises.						
15	8.1 Explain monogastric enterprises 8.2 Explain types of records (Production, Health, Financial etc.). 8.3 Explain the value of records in decision making. 8.4 Explain the application of digital devices for record-keeping in monogastric business enterprises.	• Discuss monogastric enterprises • Describe types of records (Production, Health, Financial etc.). • Discuss the value of records in decision making. • Discuss the application of digital devices for record-keeping in monogastric business enterprises.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Sample logbooks, calculators, etc.	• Design record sheets for a monogastric farm (e.g., daily egg production, feed consumption, mortality records etc). • Practice entering data into record books using simple calculations to analyze performance indicators (e.g., Feed Conversion Ratio, Mortality Rate, Production Percentage etc). • Analyze data to make meaningful management decisions.	Guide students to: • Design and customize record sheets for a monogastric farm (e.g., daily egg production, feed consumption, mortality records etc). • Practice entering data into record books using simple calculations to analyze performance indicators	Sample logbooks, calculators, basic spreadsheet software, practical manual.

					(e.g., Feed Conversion Ratio, Mortality Rate, Production Percentage etc). • Analyze data to make meaningful management decisions.	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

FISHERIES AND AQUACULTURE PRODUCTION

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: FISHERIES AND AQUACULTURE PRODUCTION	COURSE CODE: AGT 124	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in fish production, aquaculture management, and sustainable fisheries practices		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand Fisheries and Aquaculture; 2.0 Know site selection criteria and pond construction techniques; 3.0 Know fish breeding and stocking techniques; 4.0 Understand fish feeding and water quality management practices; 5.0 Understand fish health management and harvesting techniques; 6.0 Understand fish processing, preservation and marketing practice.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: FISHERIES AND AQUACULTURE PRODUCTION			COURSE CODE: AGT 124		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in fish production, aquaculture management, and sustainable fisheries practices						
GENERAL OBJECTIVE 1.0: Understand fisheries and aquaculture systems						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define fisheries and aquaculture and explain their importance. 1.2 Differentiate between capture fisheries and aquaculture systems. 1.3 Explain types of aquaculture systems (extensive, semi-intensive, intensive etc) 1.4 Explain culturable fish species used in aquaculture (catfish, tilapia, carp etc). 1.5 State the criteria for selecting fish species for culture (fast growth rate, market demand,	• Explain fisheries concepts using local examples • Use charts and pictures to identify fish species • Compare aquaculture systems with practical examples • Explain fish life cycle using diagrams	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Fish Samples Monographs, etc.	• Identify different fish species and classify them • Observe fish characteristics and behaviour • Classify aquaculture systems based on observation • Record observations of fish species and systems	Guide students to: • Field trips to fish farm • Identify and classify commonly cultured fish species • Observe and record observations.	Fish samples, aquaculture facility, practical manual.

	availability fingerlings etc) 1.6 Explain life cycle of fish. 1.7 Describe factors affecting fish production (water quality, feed, management etc). 1.8 Explain the contribution of fisheries to food security and income generation.					
General Objective 2.0: Know Site selection criteria and pond construction techniques						
3 - 5	2.1 Explain criteria for site selection for fish farming (water source, soil type, topography etc) 2.2 Describe types of fish culture materials (earthen, concrete, plastic tanks etc) 2.3 Explain fish pond design and layout 2.4 Describe step- by -step action plan in pond construction 2.5 Explain pond preparation techniques (draining, liming,	• Explain site selection criteria using real farm examples • Discuss pond design and layout using diagrams. • Describe pond preparation techniques (earthen and concrete) • Discuss advantages of different pond systems	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Tools, etc.	• Select suitable site for pond construction (simulation/field) • Measure pond layout • Mark pond layout • Carry out pond construction (where possible). • Prepare ponds (cleaning, liming, fertilization etc) • Manage water levels in pond	Guide students to: • Demonstrate site selection and pond layout • Measure and mark pond layout • Carry out pond construction (where possible). • Ensure correct application of lime and fertilizers.	Measuring tools, lime, farm tools, Fertilizers, practical manuals, Excavation equipment.

	fertilization etc) 2.6 Explain importance of water management in aquaculture 2.7 Describe advantages and limitations of different fish culture media.					
General Objective 3.0: Know fish breeding and stocking techniques						
6 – 8	3.1 Explain the basic principles of fish reproduction and breeding. 3.2 Explain broodstock selection criteria 3.3 Explain hatchery management practices 3.4 Describe fish seed (fingerlings) and their importance 3.5 Explain stocking density 3.6 Explain factors affecting stocking density. 3.6 Explain transportation and handling of fish seed	• Explain breeding concepts using diagrams and examples • Discuss broodstock selection criteria • Discuss hatchery operations and management • Explain stocking procedures and density calculations.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures Etc.	• Identify broodstock and fingerlings • Demonstrate fish handling and transportation • Carry out stocking of fish in ponds • Calculate stocking density • Observe fish behaviour after stocking	Guide students to: • Demonstrate fish handling techniques • Use stocking procedures • Supervise pond stocking activities • Ensure proper handling to avoid stress • Monitor and correct errors	Fish fingerlings, Ponds, Nets Videos, practical manual.
General Objective 4.0: Know fish feeding and water quality management practices						
9 – 11	4.1 Explain the importance of feeding in fish production	• Explain feeding concepts using practical examples	Textbooks, Journals, Internet,	• Feed fish using appropriate methods	Guide students to: • Demonstrate	Fish fish feed,

	4.2 Explain types of fish feed (natural and artificial) 4.3 Describe feed formulation and feeding methods 4.4 Explain feeding schedules and rationing 4.5 Explain water quality parameters (temperature, pH, dissolved oxygen etc). 4.6 Describe effects of poor water quality on fish health 4.7 Explain water quality management techniques	• Display different feed types and their composition • Discuss feeding methods and schedules • Explain water quality parameters using charts • Discuss effects of poor water quality.	Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Feed Samples, Water Quality, Test Kits, Videos, etc.	and quantities • Observe fish feeding behaviour and response • Measure water quality parameters (where possible) • Maintain proper feeding schedules • Record feeding and water quality data	feeding procedures step-by-step • Carry out feeding and monitoring fish • Test water quality • Monitor fish behaviour and correct practices	ponds, water quality test kits videos, practical manual.
General Objective 5.0: Understand fish health management and harvesting techniques						
12 – 13	5.1 Define fish health management and its importance 5.2 Explain common fish diseases and parasites 5.3 Describe signs and symptoms of diseased fish 5.4 Explain disease prevention and control measures 5.5 Describe harvesting methods (partial and total harvesting)	• Explain fish health concepts using examples • Describe signs of fish diseases using samples • Describe harvesting techniques • Discuss preservation methods	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures of diseased fish, etc	• Identify signs of diseases in fish • Apply basic disease control measures • Harvest fish using nets or other tools • Handle fish properly to avoid damage • Record harvest data	Guide students to: Identify signs of diseases in fish • Apply basic disease control measures • Harvest fish using nets or other tools • Handle fish properly to avoid damage • Record harvest	Nets, fish, ponds Videos Pictures of diseased fish, practical manual.

	5.6 Describe the tools (fishing gears) use in fish harvesting (nets, hook and line, traps etc) 5.6 Explain factors affecting harvesting time 5.7 Explain handling and preservation of harvested fish				data	
General Objective 6.0: Understand fish processing, preservation and marketing practice						
14 - 15	6.1 Explain importance of fish processing and preservation. 6.2 Describe methods of fish preservation. 6.3 Explain basic fish processing techniques. 6.4 Describe value addition in fish processing and preservation. 6.5 Explain marketing of fish and fish products. 6.6 Explain hygiene and food safety practices in fish handling.	• Discuss processing methods using examples. • Explain preservation techniques. • Discuss value addition and marketing strategies. • Discuss food safety practices.	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures etc.	• Process fish using basic methods (smoking/drying where possible). • Maintain hygiene during processing. • Preserve fish using appropriate techniques. • Package fish products. • Identify marketing opportunities.	Guide students to; • Process fish using basic methods (smoking/drying where possible). • Maintain hygiene during processing. • Preserve fish using appropriate techniques. • Package fish products. • Identify marketing opportunities.	Processing tools, fish, packaging materials Videos Pictures, practical manual.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	100%



AGRO-CLIMATOLOGY

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: AGRO-CLIMATOLOGY	COURSE CODE: AGT 125	CONTACT HOURS: 3HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to enable students with knowledge and skills of climatology as it affects agricultural production in the tropics.		
General Objectives: On completion of this course, the students should be able to: 1.0 Understand simple definitions and concepts in weather and climate; 2.0 Understand the different weather and climatic measuring instruments and their practical applications; 3.0 Understand the factors influencing climate and weather patterns in agricultural environments; 4.0 Understand the impact of weather and climate on agriculture, ecosystems and human activities; 5.0 Understand temperature patterns and their influence on weather and agricultural production; 6.0 Understand atmospheric pressure systems, wind patterns and their effects on weather and climate in West Africa; 7.0 Understand the locations, characteristics and agricultural influence of ocean currents affecting West Africa and Africa; 8.0 Understand the processes, causes and distribution of rainfall and aridity in tropical environments 9.0 Understand the agro-climatic regions of Nigeria and West Africa and their implications for agricultural planning. 10.0 Understand climate variability, climate risks and basic climate adaptation strategies in agriculture. 11.0 Understand the principles and practices of climate-smart agriculture for sustainable production.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: AGRO-CLIMATOLOGY			COURSE CODE: AGT 125		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
GOAL: This course is designed to enable students to understand climatology as it affects agricultural production in the tropics.						
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
General Objective: 1.0. Understand simple definitions and concepts in weather, climate, climate variability and climate change						
THEORETICAL CONTENT				PRACTICAL CONTENT		
WEEK	Specific Learning Objectives	Teachers Activities	Resources	Specific Learning Objectives	Teachers Activities	Resources
1–2	1.1 Explain weather, climate, climate variability and climate change. 1.2 Explain humidity, evaporation, evapotranspiration, atmospheric pressure, solar radiation (insolation), aridity and precipitation. 1.3 Distinguish between weather and climate using temporal and spatial scales. 1.4 Explain the components of the atmosphere and their relevance to agriculture. 1.5 Explain the major	• Discuss weather, climate, climate variability and climate change. • Explain humidity, evaporation, evapotranspiration, atmospheric pressure, solar radiation (insolation), aridity and precipitation. • Expatiate weather and climate using temporal and spatial scales. • Explain the components of the atmosphere	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Atmospheric, Weather Maps, LCD Videos Laptop, Climatic Data Samples, etc.	• Identify daily weather elements in the school/farm environment. • Measure simple weather including temperature, rainfall, wind direction and cloud conditions over a two-week period. • Record observations • Maintain a weather diary/logbook • Perform data analysis to compare daily weather observations to short-term weather variability. • Identify cloud	Guide students to; • Identify daily weather elements in the school/farm environment. • Measure simple weather including temperature, rainfall, wind direction and cloud conditions over a two-week period. • Record observations • Maintain a weather diary/logbook • Compare daily weather observations to short-term weather variability. • Identify cloud types and relate them to weather conditions. • Plot simple	Weather diary/logbook , simple thermometers, improvised rain gauge, wind vane, cloud charts, observation sheets, graph sheets, field notebook manual and automated weather stations.

	elements of weather and climate and their influence on agricultural production. 1.6 Explain the relationship between weather, climate and agricultural activities. 1.7 Explain climate as a natural resource for crop and livestock production.	and their relevance to agriculture. • Discuss the major elements of weather and climate and their influence on agricultural production. • Discuss the relationship between weather, climate and agricultural activities. • Explain climate as a natural resource for crop and livestock production.		types and relate them to weather conditions. • Plot simple temperature and rainfall charts using collected data. • Interpret simple weather observations for agricultural activities such as planting, drying and harvesting	temperature and rainfall charts using collected data. • Interpret simple weather observations for agricultural activities such as planting, drying and harvesting	
General Objective: 2.0. Understand the different weather and climatic measuring instruments and their practical applications.						
3–4	2.1 Explain common meteorological instruments used in weather observation and agricultural climatology. 2.2 Explain the functions and principles of operation of meteorological	• Discuss common meteorological instruments used in weather observation and agricultural climatology. • Describe the functions and principles of operation of	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, meteorological	• Identify different meteorological instruments correctly • Install simple weather instruments using standard procedures • Measure	Guide students to: • Identify different meteorological instruments correctly • Install and position simple weather instruments using standard procedures • Measure temperature, rainfall, wind speed,	Meteorological instruments, mini-weather station, improvised rain gauge materials, thermometers, wind vane materials,

	instruments. 2.3 Describe the layout and components of a standard meteorological station. 2.4 Explain the importance of weather measurements in agricultural planning and management. 2.5 Explain basic procedures for installation, handling and maintenance of weather instruments.	meteorological instruments. • Describe the layout and components of a standard meteorological station. • Discuss the importance of weather measurements in agricultural planning and management. • Discuss basic procedures for installation, handling and maintenance of weather instruments.	instruments, LCD, Meteorological station, Layout diagrams, etc.	temperature, rainfall, wind speed, wind direction and relative humidity • Construct improvised simple weather instruments using locally available materials • Practice calibration, cleaning and maintenance of instruments • Set up a simple mini-weather station within the school or farm environment • Maintain instrument observation records and practical logbook	wind direction and relative humidity • Construct improvised simple weather instruments using locally available materials • Practice calibration, cleaning and maintenance of instruments • Set up a simple mini-weather station within the school/farm environment • Maintain instrument observation records and practical logbook	measuring sheets, practical logbook, field notebook, practical manual
General Objective 3.0: Understand the factors influencing climate and weather patterns in agricultural environments						
5–6	3.1 Explain climatic and geographical factors influencing weather and climate: latitude, altitude, topography,	• Discuss climatic and geographical factors influencing weather and climate: latitude, altitude, topography,	Textbooks, Journals, Internet, Projector, Computer,	• Observe microclimatic conditions in different environments (open	Guide students to: • Observe microclimatic conditions in different environments (open field, under trees,	Climatic maps, topographic maps, thermometers,

	vegetation, air masses, ocean currents and distance from the sea 3.2 Explain the influence of landforms such as valleys, plains, uplands and plateau on local climate and agricultural activities 3.3 Explain the relationship between vegetation cover and microclimate formation 3.4 Explain the effects of afforestation and deforestation on weather, climate and agricultural productivity 3.5 Describe the role of human activities in modifying local climate conditions 3.6 Explain the influence of climate factors on crop distribution, livestock production and farming systems	vegetation, air masses, ocean currents and distance from the sea • Discuss the influence of landforms such as valleys, plains, uplands and plateau on local climate and agricultural activities • Describe the relationship between vegetation cover and microclimate formation • Discuss the effects of afforestation and deforestation on weather, climate and agricultural productivity • Describe the role of human activities in modifying local climate conditions • Discuss the influence of climate factors on crop distribution, livestock production and farming systems	Diagrams/charts, Marker board, Marker, Pictures, Climatic Maps, Topographic Maps, Videos, Satellite Agricultural Land-Use Maps, etc.	field, under trees, valleys, uplands, built-up areas etc.) • Measure temperature, humidity and wind differences across selected locations • Conduct field visits to different landforms and vegetation zones • Identify effects of vegetation cover on soil moisture and temperature conditions • Prepare simple field reports on observed climatic variations and agricultural implications • Interpret climatic maps and relate them to farming activities in different ecological zones • Demonstrate effects of land use and vegetation	valleys, uplands, built-up areas etc.) • Measure temperature, humidity and wind differences across selected locations • Conduct field visits to different landforms and vegetation zones • Identify effects of vegetation cover on soil moisture and temperature conditions • Prepare simple field reports on observed climatic variations and agricultural implications • Interpret climatic maps and relate them to farming activities in different ecological zones • Demonstrate effects of land use and vegetation removal on local environmental conditions	observation sheets, field notebook, vegetation survey materials, graph sheets, mini-weather station equipment, practical manual
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				removal on local environmental conditions		
General Objective 4.0: Understand the impact of weather and climate on agriculture, ecosystems and human activities.						
7	4.1 Explain the effects of weather and climate on crop growth, livestock production and fisheries 4.2 Explain the influence of weather on pests, diseases and weed infestation 4.3 Explain the effects of weather and climate on soil erosion, flooding and drought 4.4 Explain the relationship between climate and human activities including health, settlement and transportation 4.5 Describe simple methods of modifying or adapting to local weather conditions for agricultural production	• Discuss the effects of weather and climate on crop growth, livestock production and fisheries • Discuss the influence of weather on pests, diseases and weed infestation • Explain the effects of weather and climate on soil erosion, flooding and drought • Discuss the relationship between climate and human activities including health, settlement and transportation • Describe simple methods of modifying or adapting to local weather conditions	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Case Studies, Climatic Disaster Photographs, etc.	• Observe effects of weather conditions on crops, livestock and soil • Identify weather-related pest and disease incidences in the field • Conduct simple field assessment of erosion and moisture conditions • Prepare short reports on observed climatic impacts in the local environment	Guide students to: • Observe effects of weather conditions on crops, livestock and soil • Identify weather-related pest and disease incidences in the field • Conduct simple field assessment of erosion and moisture conditions • Prepare short reports on observed climatic impacts in the local environment	Farms, field sites, observation sheets, field notebook, camera/photos Meteorological equipment, practical manual.

		for agricultural production				
General Objective 5.0: Understand temperature patterns and their influence on weather and agricultural production.						
8	5.1 Define temperature fields and isotherms 5.2 Explain daily and seasonal temperature variations 5.3 Explain factors influencing temperature distribution 5.4 Explain the influence of temperature on crop growth, livestock productivity and soil processes 5.5 Explain the relationship between temperature and evapotranspiration	• Explain temperature fields and isotherms • Discuss daily and seasonal temperature variations • Describe factors influencing temperature distribution • Discuss the influence of temperature on crop growth, livestock productivity and soil processes • Discuss the relationship between temperature and evapotranspiration	Textbooks Journals Internet Projector Diagrams/Charts Marker Board Marker Pictures Temperature Maps	• Measure temperature at different times and locations • Plot temperature graphs and compare variations • Observe effects of temperature on soil moisture and crop conditions • Interpret simple temperature data for agricultural use	Guide students to: • Measure temperature at different times and locations • Plot temperature graphs and compare variations • Observe effects of temperature on soil moisture and crop conditions • Interpret simple temperature data for agricultural use	Thermometers, graph sheets, data sheets, field notebook Soil thermometer, practical manual
General Objective: 6.0 Understand atmospheric pressure systems, wind patterns and their effects on weather and climate in West Africa.						
9–10	6.1 Explain atmospheric pressure and pressure belts 6.2 Explain major pressure systems affecting West Africa	• Discuss atmospheric pressure and pressure belts • Discuss major pressure systems	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts,	• Measure wind speed and wind direction using instruments • Maintain daily wind observation	Guide students to: • Measure wind speed and wind direction using instruments • Maintain daily wind observation records	Wind vane, anemometer, charts, graph sheets, field notebook Seasonal

	6.3 Explain prevailing winds and seasonal wind movements in West Africa 6.4 Explain the influence of pressure and wind systems on rainfall and agricultural activities 6.5 Explain the significance of wind direction and wind speed in agriculture	affecting West Africa • Describe prevailing winds and seasonal wind movements in West Africa • Explain the influence of pressure and wind systems on rainfall and agricultural activities • Discuss the significance of wind direction and wind speed in agriculture	Marker board, Marker, Pictures, Maps, etc.	records • Draw simple wind roses and pressure diagrams • Interpret diagrams • Observe effects of wind on crops, soil erosion and evaporation	• Draw simple wind roses and pressure diagrams • Interpret diagrams • Observe effects of wind on crops, soil erosion and evaporation	Climate prediction document by NiMeT, practical manual
General Objective 7.0: Understand the locations, characteristics and agricultural influence of ocean currents affecting West Africa and Africa.						
11	7.1 Explain major ocean currents around Africa 7.2 Explain warm and cold ocean currents 7.3 Explain the influence of ocean currents on rainfall, temperature and agricultural activities in West Africa 7.4 Explain the relationship between	• Discuss major ocean currents around Africa • Discuss warm and cold ocean currents • Describe the influence of ocean currents on rainfall, temperature and agricultural activities in West Africa • Discuss the	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Maps, Videos, etc.	• Draw ocean currents around Africa • Interpret maps showing ocean current movements • Relate ocean currents to agricultural and fishing activities	Guide students to: • Draw ocean currents around Africa • Interpret maps showing ocean current movements • Relate ocean currents to agricultural and fishing activities	Maps, atlases, drawing materials, graph sheets, practical manual

	ocean currents and fishing activities	relationship between ocean currents and fishing activities				
General Objective 8.0: Understand the processes, causes and distribution of rainfall and aridity in tropical environments						
12	8.1 Explain evaporation, condensation and precipitation processes 8.2 Explain rainfall formation and types of rainfall 8.3 Explain causes of aridity and drought 8.4 Explain seasonal rainfall distribution in Nigeria and West Africa 8.5 Explain effects of rainfall variability on agriculture	• Discuss evaporation, condensation and precipitation processes • Describe rainfall formation and types of rainfall • Discuss causes of aridity and drought • Discuss seasonal rainfall distribution in Nigeria and West Africa • Discuss effects of rainfall variability on agriculture	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Rainfall Maps, etc.	• Record rainfall data. • Plot rainfall graphs • Interpret seasonal trends. • Observe local rainfall patterns and drainage conditions. • Identify effects of drought and excessive rainfall in the environment.	Guide students to: • Record rainfall data. • Plot rainfall graphs • Interpret seasonal trends. • Observe local rainfall patterns and drainage conditions. • Identify effects of drought and excessive rainfall in the environment.	Rain gauge, rainfall charts, graph sheets, observation notebook, practical manual
General Objective 9.0: Understand the agro-climatic regions of Nigeria and West Africa and their implications for agricultural planning.						
13	9.1 Explain agro-climatic regions of Nigeria and West Africa 9.2 Explain climatic characteristics of each region 9.3 Explain agro-climatic zones in	• Discuss agro-climatic regions of Nigeria and West Africa • Explain climatic characteristics of each region • Discuss agro-	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures,	• Interpret agro-climatic maps of Nigeria and West Africa. • Analyze climatic data for selected locations. • Prepare simple agro-climatic	Guide students to: • Interpret agro-climatic maps of Nigeria and West Africa. • Analyze climatic data for selected locations. • Prepare simple agro-climatic reports for agricultural planning.	Maps, climatic data sheets, graph sheets, field notebook, drawing materials Seasonal Climate

	relation to crop and livestock production systems 9.4 Explain the use of climatic data in agricultural planning 9.5 Explain the interpretation of weather maps, rainfall charts and climatic data for agricultural purposes	climatic zones in relation to crop and livestock production systems • Explain the use of climatic data in agricultural planning • Discuss the interpretation of weather maps, rainfall charts and climatic data for agricultural purposes	Agro-climatic Maps, Rainfall, etc Weather data sheets, etc.	reports for agricultural planning. • Apply climatic information to crop selection and farm operations	• Apply climatic information to crop selection and farm operations	prediction document by NiMeT, practical manual
General Objective 10.0: Understand climate variability, climate risks and basic climate adaptation strategies in agriculture.						
14	10.1 Define climate variability and climate risks 10.2 Explain causes and indicators of climate variability in tropical environments 10.3 Explain common climate hazards affecting agriculture 10.4 Explain the effects of climate variability on crops, livestock, fisheries and soil resources 10.5 Explain climate	• Explain climate variability and climate risks • Explain causes and indicators of climate variability in tropical environments • Discuss common climate hazards affecting agriculture • Describe the effects of climate variability on crops, livestock, fisheries	Textbooks Journals Internet Projector Diagrams/Charts Marker Board Marker Pictures Climatic risk Maps Case studies, etc	• Identify evidence of climate risks in the local environment • Conduct simple field assessment of erosion, drought or flood effects. • Analyze local climate records for variability trends. • Prepare short reports on observed climate hazards and	Guide students to: • Identify evidence of climate risks in the local environment • Conduct simple field assessment of erosion, drought or flood effects. • Analyze local climate records for variability trends. • Prepare short reports on observed climate hazards and adaptation practices	Climatic data sheets, field notebook, observation sheets, photographs, maps, practical manual

	adaptation and risk reduction strategies in agriculture	and soil resources •Discuss climate adaptation and risk reduction strategies in agriculture		adaptation practices		
General Objective 11.0: Understand the principles and practices of climate-smart agriculture for sustainable production.						
15	11.1 Define climate-smart agriculture (CSA) 11.2 Explain the principles of productivity, adaptation and mitigation in CSA 11.3 Explain climate-smart agricultural practices suitable for local farming systems 11.4 Explain the role of soil and water conservation in climate-smart agriculture 11.5 Explain the sustainable land management practices for improving resilience	• Discuss climate-smart agriculture (CSA) and the principles of productivity, adaptation and mitigation in CSA • Explain climate-smart agricultural practices suitable for local farming systems • Describe the role of soil and water conservation in climate-smart agriculture • Discuss the sustainable land management practices for improving resilience	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Field demonstrations Agricultural manuals, etc	• Practice simple climate-smart agricultural techniques such as mulching, cover cropping, water conservation and soil protection. • Observe conservation structures and sustainable farming practices in the field. • Prepare practical reports on CSA practices and their agricultural benefits	Guide students to: • Practice simple climate-smart agricultural techniques such as mulching, cover cropping, water conservation and soil protection. • Observe conservation structures and sustainable farming practices in the field. • Prepare practical reports on CSA practices and their agricultural benefits	Farm plots, mulch materials, conservation tools, field notebook, demonstration site practical manual

Course Assessment:

Course work: 10%

Test/Assignments: 10%

Practical: 40%

Examination: 40%

Total: 100%



SUSTAINABLE MICRO-LIVESTOCK PRODUCTION AND APICULTURE

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: SUSTAINABLE MICRO - LIVESTOCK PRODUCTION AND APICULTURE	COURSE CODE: AGT 126	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with the skill and knowledge required for the production of micro-livestock and apiculture		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the important species of animals regarded as micro-livestock; 2.0 Understand the appropriate housing and equipment for micro-livestock production; 3.0 Comprehend the principles of nutrition and feeding for micro-livestock; 4.0 Understand modern reproduction and breeding techniques for micro-livestock; 5.0 Understand routine management practices for different species of micro-livestock; 6.0 Know common diseases and pests of micro-livestock animals and apply integrated disease prevention and control strategies; 7.0 Understand the economic potential and value chain of micro-livestock production; 8.0 Know the role of micro-livestock in food security, sustainable agriculture, and climate change mitigation; 9.0 Appreciate the benefits of apiculture and equipment used in aquaculture; 10.0 Know the conditions and requirements for successful apiary establishment and management; 11.0 Understand harvesting, processing and quality control in honey production.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: SUSTAINABLE MICRO - LIVESTOCK SYSTEMS			COURSE CODE: AGT 126		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the skill and knowledge required for the production of micro-livestock and apiculture						
GENERAL OBJECTIVE: 1.0 Understand the important species of animals regarded as micro-livestock.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Explain the term micro-livestock and its global significance. 1.2 Explain various traditional species/varieties of micro-livestock (e.g. Rabbit, Edible land snail, Grasscutter/cane rat, Giant bush rat, Guinea pigs, Pigeons, Quails etc.) 1.3 Explain emerging micro-livestock species, with a focus on edible insects (e.g., crickets, mealworms, grasshopper etc.) and their potential in food	• Discuss micro-livestock and its global significance. • Discuss various traditional species/varieties of micro-livestock (e.g. Rabbit, Edible land snail, Grasscutter/cane rat, Giant bush rat, Guinea pigs, Pigeons, Quails etc.) • Describe emerging micro-livestock species, with a focus on edible insects (e.g., crickets, mealworms,	Teaching Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, , Micro-livestock species samples, Market centers, Charts, etc.	• Undertake field trip(s) to local farms or markets. • Identify micro-livestock species. • Observe the conduct of micro-livestock trade. • Identify adaptive features and behavior in micro-livestock, considering environmental factors. • Write a technical report on study visit	Guide students to: • Undertake field trip(s) to local farms or markets. • Identify micro-livestock species. • Observe the conduct of micro-livestock trade. • Identify adaptive features and behavior in micro-livestock, considering environmental factors. • Write a technical	Teaching aids, Illustrations, Multimedia, Whiteboard, Micro-livestock species samples, Market centers Charts, practical manual.

	and feed security. 1.4 Explain the importance of rearing micro-livestock for food security, income generation, and sustainable agriculture. 1.5 Describe the global and local distribution of micro-livestock, their adaptive features, and suitable localities. 1.6 Describe factors contributing to the economic viability of micro-livestock farming.	grasshopper etc.) and their potential in food and feed security. • Describe the importance of rearing micro-livestock for food security, income generation, and sustainable agriculture. • Describe the global and local distribution of micro-livestock, their adaptive features, and suitable localities. • Discuss factors contributing to the economic viability of micro-livestock farming.			report on study visit	
General Objectives 2.0: Understand the appropriate housing and equipment for micro-livestock production.						
3 – 4	2.1 Describe modern housing designs for each type of micro-livestock. 2.2 Explain housing designs to climatic conditions, animal welfare, and specific peculiarities of the animals.	• Describe modern housing designs for each type of micro-livestock, emphasizing biosecurity and environmental control. • Describe housing designs to climatic conditions, animal	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker	• Construct a new micro-livestock housing models. • Modify an existing micro-livestock housing models. • Calculate space allowances for different species	Guide students to: • Construct a new micro-livestock housing models. • Modify an existing micro-livestock housing models. • Calculate space	As above, Feeders, Waterers, Materials, Measuring devices, Animals, Smart farming equipment examples, Waste management tools,

	2.3 Explain the principles of stocking density, foundation stock procurement, and space requirements for each species, linking to health and welfare. 2.4 List essential equipment needed for rearing each species. 2.5 Explain the application of smart farming technologies (e.g., sensors, AI-driven monitoring) in micro-livestock production. 2.6 Explain the principles of waste management and utilization in micro-livestock systems.	welfare, and specific peculiarities of the animals. • Discuss the principles of stocking density, foundation stock procurement, and space requirements for each species, linking to health and welfare. • Explain essential equipment needed for rearing each species, including automated feeding and watering systems. • Describe the application of smart farming technologies (e.g., sensors, AI-driven monitoring) in micro-livestock production for improved efficiency and animal well-being. • Discuss the principles of waste management and utilization in micro-livestock systems.	board, Marker, Pictures, Feeders, Waterers, Materials, Measuring devices, Animals, Smart farming equipment examples, Waste management tools, etc,	based on welfare standards. • Carry out equipment identification and usage. • Develop presentation slide on innovative smart farming solutions for micro-livestock.	allowances for different species based on welfare standards. • Carry out equipment identification and usage. • Develop presentation slide on innovative smart farming solutions for micro-livestock.	practical manual.
General Objective 3.0: Comprehend the principles of nutrition and feeding for micro-livestock.						

5	3.1 Explain the digestive systems of various micro-livestock. 3.2 Explain various conventional and unconventional feeding resources used for micro-livestock, including agricultural by-products and insect-based feeds. 3.3 Explain feeding resources in relation to the types of digestive systems found in micro-livestock. 3.4 Explain the nutrient requirements of various species and their daily feed and water intake. 3.5 Explain the principles of feed formulation for different growth stages and production purposes. 3.6 Describe symptoms of nutritional diseases and disorders in micro-livestock and preventive measures.	• Discuss the digestive systems of various micro-livestock. • Describe various conventional and unconventional feeding resources used for micro-livestock, including agricultural by-products and insect-based feeds. • Discuss feeding resources in relation to the types of digestive systems found in micro-livestock. • Explain the nutrient requirements of various species and their daily feed and water intake. • Discuss the principles of feed formulation for different growth stages and production purposes. • Describe symptoms of nutritional diseases and disorders in micro-livestock and preventive measures.	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Charts, Feed samples, Feed analysis equipment, Feed formulation tables, Diagnostic tools, etc.	• Identify various feeding resources and their suitability for micro-livestock. • Conduct experiments on feed digestibility for different species. • Identify nutrient requirements and daily intake for various species. • Identify symptoms of nutritional diseases and provide examples. • Perform nutrient and diet analysis and feed formulation.	Guide students to: • Identify various feeding resources and their suitability for micro-livestock. • Conduct experiments on feed digestibility for different species. • Identify nutrient requirements and daily intake for various species. • Identify symptoms of nutritional diseases and provide examples. • Perform nutrient and diet analysis and feed formulation.	Charts, Feed samples, Feed analysis equipment, Feed formulation tables, Diagnostic tools Animals, Practical manual.
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General Objectives 4.0: Understand modern reproduction and breeding techniques for micro-livestock						
6	4.1 Explain the reproductive physiology of micro-livestock. 4.2 Explain modern mating procedures and breeding strategies for each type of micro-livestock. 4.3 Explain techniques for improving reproductivity and genetic traits. 4.4 Explain the different gestation periods and care required for females during gestation. 4.5 Describe egg laying and incubation in oviparous micro-livestock. 4.6 Explain post-natal care for young ones after parturition/hatching. 4.7 Explain various breeding methods in micro-livestock. 4.8 State the advantages and disadvantages of	• Explain the reproductive physiology of micro-livestock. • Discuss modern mating procedures and breeding strategies for each type of micro-livestock. • Explore techniques for improving reproductivity and genetic traits. • Explain the different gestation periods and care required for females during gestation. • Discuss egg laying and incubation in oviparous micro-livestock (e.g., snails, quails). • Discuss post-natal care for young ones after parturition/hatching. • Discuss various breeding methods in micro-livestock (e.g., pure breeding, in-	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Teaching Aids, Charts, Animals, Incubators, Study facility, Breeding records, etc.	• Participate in practical breeding exercises. • Analyze different mating procedures. • Observe incubation of snail eggs or other oviparous species. • Participate in practical sessions on neonatal care. • Carry out breeding exercises and tasks.	Guide students to: • Participate in practical breeding exercises. • Analyze different mating procedures. • Observe incubation of snail eggs or other oviparous species. • Participate in practical sessions on neonatal care. • Carry out breeding exercises and tasks.	Teaching Aids, Charts, Animals, Incubators, Study facility, Breeding records, practical manual.

	different breeding methods. 4.9 Explain basic principles of genetic selection and improvement for enhanced productivity.	breeding, cross-breeding, cross-mating in snails). •Discuss the advantages and disadvantages of different breeding methods. •Discuss basic principles of genetic selection and improvement for enhanced productivity.				
General objectives 5.0: Know routine management practices for different species of micro-livestock.						
7	5.1 Explain the importance of good sanitation and biosecurity measures in micro-livestock production. 5.2 Explain the importance of sanitation measures, including cleaning, disinfection, and pest control. 5.3 Explain proper handling techniques for each type of micro-livestock to minimize stress and injury. 5.4 List various methods of micro-livestock identification. 5.5 Explain the importance	•Explain the importance of good sanitation and biosecurity measures in micro-livestock production. •Discuss important sanitation measures, including cleaning, disinfection, and pest control. •Discuss proper handling techniques for each type of micro-livestock to minimize stress and injury. •Explain various methods of micro-livestock	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Animals, Farm visit, Unit visit, Handling equipment, Record books, etc.	•Identify different types of micro-livestock. •Handle different types of micro-livestock. •Participate in farm visits to observe biosecurity protocols. •Identify good sanitation methods •Apply them in practical livestock husbandry. •Maintain simple record-keeping systems.	Guide students to: •Identify different types of micro-livestock. •Handle different types of micro-livestock. •Participate in farm visits to observe biosecurity protocols. •Identify good sanitation methods •Apply them in practical livestock	Animals, Farm visit, Unit visit, Handling equipment, Record books, practical manual.

	of accurate record-keeping for production, health, and breeding. 5.6 Explain precision livestock farming techniques for optimized management, including automated monitoring and data analysis.	identification. • Discuss the importance of accurate record-keeping for production, health, and breeding. • Discuss precision livestock farming techniques for optimized management, including automated monitoring and data analysis.			husbandry. • Maintain simple record-keeping systems.	
General objectives 6.0: Know common diseases and pests of micro-livestock animals and apply integrated disease prevention and control strategies.						
8-9	6.1 List common diseases, pests, and parasites of various micro-livestock. 6.2 Explain symptoms of diseased animals and diagnostic methods. 6.3 Explain preventive measures against diseases, pests, and parasites, including vaccination and biosecurity. 6.4 Explain the principles of integrated disease management (IDM) in micro-livestock.	• Explain common diseases, pests, and parasites of various micro-livestock. • Explain symptoms of diseased animals and understand diagnostic methods. • Explain preventive measures against diseases, pests, and parasites, including vaccination and biosecurity. • Discuss the principles of integrated disease	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Diseased animals (if available and ethically	• Observe diseased animals. • Carry out assignments on health and disease management of micro-livestock. • Design a biosecurity plan for a hypothetical micro-livestock farm.	Guide students to: • Organize practical and observe diseased animals. • Carry out assignments on health and disease management. • Design a biosecurity plan for a hypothetical micro-livestock farm.	Diseased animals (if available and ethically sourced), Treatment lotions, Disinfectants, Drugs, PPE, Biosecurity guidelines, practical manual

	6.5 Explain the roles of nutrition and environmental management in disease prevention. 6.6 Explain biosecurity plans for micro-livestock farms.	management (IDM) in micro-livestock. • Discuss the role of nutrition and environmental management in disease prevention. • Discuss biosecurity plans for micro-livestock farms.	sourced), Treatment lotions, Disinfectants, Drugs, PPE, Biosecurity guidelines, etc.			
General Objectives 7.0: Understand the economic potential and value chain of micro-livestock production.						
10	7.1 Explain the economic potential of various micro-livestock species. 7.2 Explain the value chain of micro-livestock products, from production to consumption. 7.3 Explain entrepreneurship opportunities in micro-livestock farming and processing.	• Discuss market trends and economic viability. • Invite successful micro-livestock entrepreneurs for guest lectures.	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Market reports, Business plan templates, Guest	• Conduct market research for micro-livestock products. • Develop a business plan for a micro-livestock enterprise.	Guide students to: • Conduct market research for micro-livestock products. • Develop a business plan for a micro-livestock enterprise.	Market reports, Business plan templates, Guest speakers, practical manual.

			speakers, etc.			
General objectives 8.0: Know the role of micro-livestock in food security, sustainable agriculture, and climate change mitigation.						
11	8.1 Explain the contribution of micro-livestock to food security and sustainable development. 8.2 Explain the environmental benefits of micro-livestock farming. 8.3 Explain future trends and innovations in micro-livestock production, including policy developments and research.	• Discuss the contribution of micro-livestock to food security and sustainable development. • Discuss the environmental benefits of micro-livestock farming (e.g., lower environmental footprint, waste utilization). • Discuss future trends and innovations in micro-livestock production, including policy developments and research.	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Research papers, Policy documents, Industry reports, etc.	• Conduct a debate on the role of micro-livestock in addressing global food challenges. • Write a term paper on emerging technologies and policy support for micro-livestock.	Guide students to: • Conduct a debate on the role of micro-livestock in addressing global food challenges. • Research on emerging technologies and policy support for micro-livestock.	Research papers, Policy documents, Industry reports., practical manual, etc.
General Objectives 9.0: Appreciate the benefits of apiculture and equipment used in aquaculture						
12	9.1 Define Apiculture 9.2 Explain the different products of honeybee and their nutritive and medical value. 9.3 Explain the economic and biological importance of honeybee in crop pollination.	• Explain the benefits of honeybee rearing. • Discuss the historic significance of bees and honey • Discuss beekeeping in Nigerian regions. • Discuss apitherapy and its applications	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker	• Carry out field visits to relevant authorities and organizations responsible for beekeeping (museums, farms). • Identify the benefits of honeybee through field visits	Guide students to: • Carry out field visits to relevant authorities and organizations responsible for beekeeping (museums,	Means of transport. Apiary Bee colonies Transport work sheet Example hive and apiaries, practical manual

	9.4 Explain beekeeping in Nigerian regions. 9.5 Explain apitherapy and its applications 9.6 Distinguish the types of the beehives (Langstroth hive, Dadant hive, Observation hive etc) 9.7 Explain different parts of each hive and their measurement. 9.8 Explain bee castes and their roles.	• Distinguish the types of the beehives (Langstroth hive, Dadant hive, Observation hive etc) • Discuss different parts of each hive and their measurement. • Discuss bee castes and their roles.	board, Marker, Pictures, etc.	• Identify beekeeping information (production, producers and hives etc.) in named regions	farms). • Identify the benefits of honeybee through field visits • Identify beekeeping information (production, producers and hives etc.) in named regions.	
GENERAL OBJECTIVE 10.0: Know the conditions and requirements for successful apiary establishment and management						
13-14	10.1 Explain Swarm trapping 10.2 Explain bee space. 10.3 Explain the apiary. 10.4 Explain different types of hive arrangement in apiaries 10.5 Explain the conditions and requirements necessary for commercial apiary establishment and management (water, source of nectar, pilfering, pests and	• Explain conditions and requirements necessary for commercial suitable apiary establishment and management. • Explain the types of the bee hives and determine the different parts of each. • Explain the equipment of inspecting colonies • Explain their functions. • Explain times,	Textbooks, Journals, Internet, Projector, Computer, Diagrams/ch arts, Marker board, Marker, Pictures, etc.	• Identify materials used for baiting hives and trap swarms • Arrange hives in an apiary • Carry out routine management practices in an apiary • Provide water for bees in an apiary • Feed bees • Identify types of beehives. • Identify different parts of each hive and their	Guide students to: • Identify materials used for baiting hives and trap swarms • Arrange hives in an apiary • Carry out routine management practices in an apiary • Provide water for bees in an apiary • Feed bees • Identify types of	Lining material. An apiary, equipments for inspecting colonies. An apiary. Log book of inspection. Equipments for inspecting colonies. PPEs, Practical manual.

	disease management in apiaries) 10.6 Explain colony inspection. 10.7 Explain the times, periods and correct opening for inspection of the colonies. 10.8 Explain the objectives and cycles of inspecting the colony. 10.9 Describe inspecting before and within the nectar flow season. 10.10 Explain swarming and absconding (migration). 10.11 Explain reasons for robbing (activities detriment; protection and control). 10.12 Explain the significance of a log book during inspection 10.13 Explain laying worker (reasons; activities detriment; control). 10.14 Explain an	periods, objectives and cycles of inspecting the colonies.		measurement. • Identify bee space. • Identify equipment for inspecting colonies. • Determine correct times. • Determine correct periods • Determine correct objectives and • Determine correct cycles of inspecting colonies. • Records defects in logbook	beehives. • Identify different parts of each hive and their measurement. • Identify bee space. • Identify equipment for inspecting colonies. • Determine correct times. • Determine correct periods • Determine correct objectives and • Determine correct cycles of inspecting colonies. • Records defects in logbook	
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	understanding of colony division or artificial swarming. 10.15 Explain the importance of saving water for bees. 10.16 Distinguish between moving and displacement of bees. 10.17 Explain honeybee diseases and pests. 10.18 Explain pesticide use and learn poisoning risks.					
General Objective 11.0: Understand harvesting, processing and quality control in honey production						
15	11.1 Describe various equipment used in honey extraction. 11.2 Explain honey harvesting 11.3 Explain the correct use of honey extraction equipment. 11.4 Describe quality control in honey harvesting and processing	• Describe various equipment used in honey extraction. • Explain honey harvesting • Explain the correct use of honey extraction equipment. • Describe quality control in honey harvesting and processing	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc	• Identify equipment used in honey extraction. • Identify ripe and unripe honey • Perform test to differentiate among sealed brood, ripe and unripe honey • Use of honey extraction equipment correctly. • Perform quality tests for honey samples	Guide students to: • Identify equipment used in honey extraction. • Identify ripe and unripe honey • Perform test to differentiate among sealed brood, ripe and unripe honey • Undertake correct use of honey extraction equipment. • Demonstra	Honey press, centrifuge extractor, colander, settling tank, packaging materials, refractometer, Practical manual.

					te quality tests for honey samples	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						



INTEGRATED FARM PRACTICE I

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: INTEGRATED FARM PRACTICE I	COURSE CODE: AGT 127	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 0
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with basic skills in crop production, livestock management, fisheries operations, farm tools handling, and farm record keeping.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Apply integrated crop production practices. 2.0 Carry out livestock management operations. 3.0 Carry out basic fisheries and aquaculture operations. 4.0 Know how to operate and maintain simple farm tools, machinery, and equipment. 5.0 Maintain simple farm operational records and observe farm safety practices.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: INTEGRATED FARM PRACTICE I			COURSE CODE: AGT 127		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 2		THEORETICAL: 0	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with basic skills in crop production, livestock management, fisheries operations, farm tools handling, and farm record keeping.						
GENERAL OBJECTIVE 1.0: Apply integrated crop production practices.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3				• Prepare land for crop production using appropriate tools • Carry out nursery establishment and planting operations • Apply manure and fertilizer on crops at recommended rates • Carry out irrigation and watering operations on crop plots • Perform weed and pest control operations using safe methods • Harvest crops properly at correct maturity stage	Guide students to: • Prepare land for crop production using appropriate tools • Carry out nursery establishment and planting operations • Apply manure and fertilizer on crops at recommended rates • Carry out irrigation and watering operations on crop plots • Perform weed and pest control operations using safe methods	Farm plots, hoes, cutlasses, rakes Seedlings, seeds, nursery materials Fertilizers, manure, measuring containers Irrigation kits, watering cans Sprayers, agrochemicals, PPE Farm

				• Handle and pack harvested produce properly to reduce damage. • Record all crop production activities in a farm logbook	• Harvest crops properly at correct maturity stage • Handle and pack harvested produce properly to reduce damage. • Record all crop production activities in a farm logbook	logbooks, record sheets, practical manual.
General Objective 2.0: Know practical livestock management operations.						
4 – 6				• Prepare adequate housing in order to receive livestock • Feed livestock using appropriate feeding methods and correct quantities • Clean livestock houses and equipment regularly • Carry out routine management practices on farm animals • Identify common livestock diseases and their symptoms • Assist in vaccination and medication of animals under supervision • Maintain simple livestock production records	Guide students to: • Prepare adequate housing in order to receive livestock • Feed livestock using appropriate feeding methods and correct quantities • Clean livestock houses and equipment regularly • Carry out routine management practices on farm animals • Identify common livestock diseases and their symptoms	Livestock, pens, feeders, drinkers Feed materials, weighing scale Disinfectants, cleaning tools Vaccines, syringes, drugs, PPE Disease identification charts Livestock record sheets, logbooks,

					• Assist in vaccination and medication of animals under supervision • Maintain simple livestock production records	practical manual, etc.
General Objective 3.0: Carry out basic fisheries and aquaculture operations.						
7 – 8				• Identify common fish species and classify culture systems • Prepare fish rearing facilities and ponds for stocking • Feed fish using appropriate feeding methods and schedules • Monitor pond cleanliness and water condition regularly • Carry out pond maintenance activities • Perform fish harvesting operations under supervision • Maintain simple fisheries production records	Guide students to: • Identify common fish species and classify culture systems • Prepare fish rearing facilities and ponds for stocking • Feed fish using appropriate feeding methods and schedules • Monitor pond cleanliness and water condition regularly • Carry out pond maintenance activities • Assist in fish harvesting operations under supervision • Maintain simple fisheries production records	Fish ponds, tanks, nets Fish feed, feeding trays Water testing kits, buckets Fisheries record books, logbooks Smoking kiln, preservation tools, practical manual, etc.

General Objective 4.0: Know how to operate and maintain simple farm tools, machinery, and equipment.						
9 – 11				• Identify common farm tools and simple machinery by name and function • Operate simple farm tools and equipment safely • Carry out routine cleaning and maintenance of farm equipment • Perform sharpening and lubrication of farm tools • Demonstrate proper storage of farm equipment after use • Carry out simple mechanised farm operations under supervision	Guide students to: • Identify common farm tools and simple machinery by name and function • Operate simple farm tools and equipment safely • Carry out routine cleaning and maintenance of farm equipment • Perform sharpening and lubrication of farm tools • Demonstrate proper storage of farm equipment after use • Carry out simple mechanised farm operations under supervision	Farm hand tools, knapsack sprayers Water pumps, power tiller Lubricants, sharpening stones, toolboxes PPE (gloves, boots, goggles) Tractors and simple implements Maintenance record sheets
General Objective 5.0: Maintain simple farm operational records and observe farm safety practices						
12 – 15				• Maintain simple farm input and output records for all enterprises • Record daily farm activities and observations in a logbook	Guide students to: • Maintain simple farm input and output records for all enterprises	Record books, farm input/output templates Farm

				• Use PPE correctly during all farm operations • Identify common farm hazards and safety signs on the farm • Carry out routine farm management practices safely • Carry out basic first aid procedures for common farm accidents	• Record daily farm activities and observations in a logbook • Use PPE correctly during all farm operations • Identify common farm hazards and safety signs on the farm • Carry out routine farm management practices safely • Carry out basic first aid procedures for common farm accidents	logbooks PPE (gloves, boots, masks, overalls) Safety signs, hazard identification charts First aid kits Farm management reference sheets, Practical manual, etc.
Course Assessment Course Assessment (Practical Based):10% Practical: 50% Examination (Practical Based): 40% Total: 100%						

FARM ENGINEERING, POWER AND MECHANIZATION

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: FARM ENGINEERING, POWER AND MECHANIZATION	COURSE CODE: AGT 128	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with skills and knowledge in farm engineering principles, farm power systems and agricultural machinery for efficient agricultural production.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand principles of farm engineering, mechanization, and farm power systems; 2.0 Understand the identification and use of farm tools, implements, machinery, and equipment safely; 3.0 Know how to operate, calibrate, and maintain farm machinery and equipment; 4.0 Understand mechanised land preparation and field operation techniques; 5.0 Understand maintenance, servicing, and troubleshooting procedures for farm machinery; 6.0 Understand safety precautions and environmental protection measures in farm engineering operations.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: FARM ENGINEERING, POWER AND MECHANIZATION			COURSE CODE: AGT 128		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOURS/WEEK	
YEAR: I SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 3 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with skills and knowledge in farm engineering principles, farm power systems and agricultural machinery for efficient agricultural production.						
GENERAL OBJECTIVE 1.0: Understand principles of farm engineering, mechanization, and farm power systems.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define farm engineering, mechanization, and farm power 1.2 Explain farm engineering, mechanization, and farm power importance in agriculture 1.3 Explain levels of agricultural mechanization: manual, animal traction, partially mechanised, and fully mechanised systems 1.4 Explain the sources of farm power used in agriculture: human, animal, mechanical,	• Explain farm engineering, mechanization, and farm power • Discuss farm engineering, mechanization, and farm power importance in agriculture • Discuss levels of agricultural mechanization: manual, animal traction, partially mechanised, and fully mechanised systems • Discuss the sources of farm power used in agriculture: human, animal, mechanical,	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Farm tools, Machinery models, Tractor Power Transmission models, etc.	• Identify farm tools, machines, and mechanization systems • Observe manual, animal traction, and mechanised operations • Identify different farm power sources in operation • Carry out basic power transmission systems using belts, chains, shafts, and gears • Carry out field observation of mechanised farm	Guide students to: • Identify farm tools, machines, and mechanization systems • Observe manual, animal traction, and mechanised operations • Identify different farm power sources in operation • Carry out basic power transmission systems using belts, chains, shafts, and gears	Farm tools, tractor, water pumps, generators, chains, belts, shafts, gears, measuring tapes, vernier calipers, pressure gauges, solar irrigation kits, practical manual, etc.

	electrical, and renewable energy 1.5 Explain advantages and limitations of agricultural mechanization and farm power sources 1.6 Explain basic principles of power transmission in farm machinery 1.7 Describe environmentally safe mechanization practices 1.8 Explain modern agricultural machines and equipment used in farming.	electrical, and renewable energy • Explain advantages and limitations of agricultural mechanization and farm power sources • Discuss basic principles of power transmission in farm machinery • Describe environmentally safe mechanization practices • Discuss modern agricultural machines and equipment used in farming.		operations • Operation of simple solar-powered agricultural devices • Carry out basic engineering measurements in farm operations • Use simple measuring instruments • Prepare practical reports on mechanization systems observed	• Carry out field observation of mechanised farm operations • Demonstrate operation of simple solar-powered agricultural devices • Carry out basic engineering measurements in farm operations • Demonstrate the use of simple measuring instruments • Prepare practical reports on mechanization systems observed	
General Objective 2.0: Understand the identification and use farm tools, implements, machinery, and equipment safely.						
3 - 5	2.1 Explain common farm tools and implements used in agricultural operations 2.2 Explain the classification of farm tools according to their uses and functions 2.3 Describe materials	• Discuss the uses of different farm tools and implements • Discuss the classification of tools according to functions • Explain proper handling and maintenance	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams, Charts, Marker	• Identify farm tools and implements according to their uses • Demonstrate proper handling of farm tools and equipment • Perform sharpening and maintenance of	Guide students to: • Identify farm tools • Implements according to their uses • Demonstrate proper handling of farm tools and	Farm tools, cutlasses, hoes, files, grinders, PPE, storage racks, workshop, safety signs, first aid box, practical manual.

	used in manufacturing farm tools and implements 2.4 Explain proper handling and care of farm tools and equipment 2.5 Explain procedures for sharpening and maintenance of farm tools 2.6 Explain workshop safety rules and precautions 2.7 Explain personal protective equipment (PPE) used in farm engineering operations 2.8 Explain safe storage procedures for farm tools and equipment.	procedures • Explain sharpening techniques • Discuss workshop safety rules and accident prevention • Explain the use of PPE during practical sessions	board, Marker, Pictures, Farm tools, Workshop equipment, Sharpening tools, PPE, Safety posters, etc.	simple farm tools • Demonstrate cleaning and proper storage of tools after use • Use PPE correctly during workshop and field operations • Identify common workshop hazards and safety signs • Demonstrate safe movement and handling of tools in the workshop	equipment • Perform sharpening and maintenance of simple farm tools • Demonstrate cleaning and proper storage of tools after use • Use PPE correctly during workshop and field operations • Identify common workshop hazards and safety signs • Demonstrate safe movement and handling of tools in the workshop	
General Objective 3.0: Know how to operate, calibrate, and maintain farm machinery and equipment.						
6 – 8	3.1 Explain common agricultural machinery and equipment used in farming operations 3.2 Describe functions of tillage, planting, spraying, harvesting, and processing equipment	• Discuss common agricultural machinery and equipment used in farming operations • Describe functions of tillage, planting, spraying, harvesting, and processing equipment	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board,	• Identify major parts of agricultural machinery and equipment • Operate simple farm machinery and equipment under supervision • Carry out calibration	Guide students to: • Identify major parts of agricultural machinery and equipment • Operate simple farm machinery and equipment	Tractor, knapsack sprayers, planters, tillage implements, lubricants, grease guns, tool kits, maintenance logbooks, workshop manuals, Practical

	3.3 Explain basic operating principles of farm machinery 3.4 Explain principles of machinery calibration 3.5 Explain routine maintenance procedures for farm machinery and equipment 3.6 Explain common faults associated with farm machinery 3.7 Explain importance of preventive maintenance and servicing	• Discuss basic operating principles of farm machinery • Discuss principles of machinery calibration • Discuss routine maintenance procedures for farm machinery and equipment • Describe common faults associated with farm machinery • Discuss importance of preventive maintenance and servicing	Marker, Pictures, Tractor, Sprayers, Planters, Tillage implements, Machinery manuals, Lubricants, etc.	of knapsack sprayers and simple planters • Carry out routine cleaning and lubrication of machinery • Demonstrate servicing procedures for simple farm equipment • Identify common machinery faults during operation • Prepare simple machinery maintenance records	under supervision • Carry out calibration of knapsack sprayers and simple planters • Carry out routine cleaning and lubrication of machinery • Demonstrate servicing procedures for simple farm equipment • Identify common machinery faults during operation • Prepare simple machinery maintenance records	manual, etc.
General Objective 4.0: Understand mechanised land preparation and field operation techniques.						
9 – 11	4.1 Explain methods and stages of land preparation 4.2 Explain primary and secondary tillage operations 4.3 Describe functions of tillage implements used	• Discuss methods and stages of land preparation • Discuss primary and secondary tillage operations • Describe functions of tillage implements	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/ch arts,	• Use tillage implements during field operations • Carry out simple land preparation operations • Carry out mechanised planting and spraying	Guide students to: • Use tillage implements during field operations • Demonstrate simple land preparation	Tractor, ploughs, harrows, ridgers, knapsack sprayers, planters, harvesting tools, PPE, demonstration farm

	in land preparation 4.4 Explain mechanised planting and spraying operations 4.5 Explain mechanised weed and pest control operations 4.6 Describe mechanised harvesting and post-harvest operations 4.7 Explain the effects of improper mechanization on soil and environment 4.8 Explain basic environmentally safe mechanization practices	used in land preparation • Discuss mechanised planting and spraying operations • Describe mechanised weed and pest control operations • Describe mechanised harvesting and post-harvest operations • Discuss the effects of improper mechanization on soil and environment • Discuss basic environmentally safe mechanization practices	Marker board, Marker, Pictures, Farm plots, Tractor Ploughs, Harrows, Ridgers, Sprayers, Planting equipment, etc.	operations under supervision • Carry out simple weed and pest control operations using sprayers • Observe mechanised harvesting operations • Compare manual and mechanised field operations • Demonstrate safe handling of mechanised field equipment	operations • Carry out mechanised planting and spraying operations under supervision • Carry out simple weed and pest control operations using sprayers • Observe mechanised harvesting operations • Compare manual and mechanised field operations • Demonstrate safe handling of mechanised field equipment	Boom sprayer, Practical manual.
General Objective 5.0: Understand maintenance, servicing, and troubleshooting procedures for farm machinery.						
12 – 13	5.1 Explain types of maintenance: preventive and corrective maintenance 5.2 Explain servicing schedules for farm machinery and equipment	• Explain maintenance concepts and schedules • Discuss routine servicing procedures • Discuss causes of machinery breakdowns and troubleshooting methods	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker	• Carry out routine maintenance of simple farm machinery and equipment • Demonstrate cleaning, lubrication, and servicing procedures • Identify simple	Guide students to: • Carry out routine maintenance of simple farm machinery and equipment • Demonstrate cleaning,	Tractor, grease guns, lubricants, servicing tools, maintenance logbooks, workshop tools, storage shed, practical manual.

	5.3 Describe basic troubleshooting procedures for farm machinery 5.4 Explain causes of common machinery breakdowns 5.5 Explain importance of proper maintenance culture in agriculture 5.6 Explain importance of maintenance records and documentation	• Explain maintenance record keeping procedures • Discuss economic importance of preventive maintenance	board, Marker, Pictures, Tractor, Machinery Manuals, Servicing, Lubricants, Workshop Tools, etc.	machinery faults and defects • Carry out basic troubleshooting procedures under supervision • Prepare simple machinery maintenance records • Demonstrate proper storage of machinery and equipment after use	lubrication, and servicing procedures • Identify simple machinery faults and defects • Carry out basic troubleshooting procedures under supervision • Prepare simple machinery maintenance records • Demonstrate proper storage of machinery and equipment after use	
General Objective 6.0: Understand safety precautions and environmental protection measures in farm engineering operations						
14 - 15	6.1 Explain the importance of safety in farm engineering operations 6.2 Explain common hazards associated with farm tools, machinery, and workshop operations 6.3 Explain the causes of common farm and workshop accidents 6.4 Explain safety rules and	• Explain the importance of safety in farm engineering operations • Describe common hazards associated with farm tools, machinery, and workshop operations • Discuss the causes of common farm and workshop accidents	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Safety	• Identify common hazards in workshops and farm operations • Carry out proper use of PPE during workshop and field activities • Carry out safe handling of farm machinery and tools • Practice safe movement and storage	Guide students to: • Identify common hazards in workshops and farm operations • Carry out proper use of PPE during workshop and field activities • Carry out safe handling of farm machinery and	PPE, safety boots, gloves, helmets, first aid kits, fire extinguishers, workshop tools, waste disposal containers, safety signs, practical manual.

	precautions in handling farm machinery and equipment 6.5 Explain the importance and uses of personal protective equipment (PPE) 6.6 Explain basic first aid procedures for common farm and workshop accidents 6.7 Explain environmentally safe practices in machinery operation and waste disposal	• Discuss safety rules and precautions in handling farm machinery and equipment • Describe the importance and uses of personal protective equipment (PPE) • Discuss basic first aid procedures for common farm and workshop accidents • Discuss environmentally safe practices in machinery operation and waste disposal	Posters, PPE, First Aid Kits Workshop Manuals, Charts, etc.	of tools and equipment • Demonstrate basic first aid procedures for minor injuries • Carry out routine safety inspection of workshop and machinery areas • Demonstrate safe disposal of waste materials and used lubricants	tools • Practice safe movement and storage of tools and equipment • Demonstrate basic first aid procedures for minor injuries • Carry out routine safety inspection of workshop and machinery areas • Demonstrate safe disposal of waste materials and used lubricants	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						



YEAR II SEMESTER I

RESEARCH METHODS AND EXPERIMENTAL DESIGN

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: RESEARCH METHODS AND EXPERIMENTAL DESIGN	COURSE CODE: AGR 201	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with the knowledge and skills required to design, conduct, and analyse agricultural research, and to present research outcome in a logical order.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the basic concepts and importance of research in agriculture; 2.0 Know how to identify and formulate research problems and hypotheses; 3.0 Understand the different types of research designs and sampling techniques; 4.0 Comprehend the methods of data collection in agricultural research; 5.0 Understand the basic principles of experimental design (CRD, RCBD, etc); 6.0 Understand the methods of data processing and analysis using descriptive and inferential statistics.; 7.0 Know how to use modern digital tools and software for data analysis; 8.0 Understand the principles of research reporting and technical writing.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: RESEARCH METHODS AND EXPERIMENTAL DESIGN			COURSE CODE: AGR 201		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 2		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 1 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and skills required to design, conduct, and analyse agricultural research, and to present research outcome in a logical order.						
GENERAL OBJECTIVE 1.0: Understand the basic concepts and importance of research in agriculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Define research and its roles in agriculture. 1.2 List the types of research 1.3 Distinguish between basic, applied, and adaptive research. 1.4 Explain the aims of research	• Explain research and the types of research • Explain the impact of research on productivity of crop, livestock, fish, etc. • Discuss ethics in research.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	• Conduct a simple search for agricultural research papers in the library or online. • Identify the type of research (basic vs. applied) from provided abstracts	Guide students to: • Conduct a simple search for agricultural research papers in the library or online. • Identify the type of research (basic vs. applied) from provided abstracts.	Projector Video/Audio devices Models Internet Lecture notes Charts Pictures Whiteboard Marker Computer, practical manual
General Objective 2.0: Know how to identify and formulate research problems and hypotheses.						
2-3	2.1 Explain the sources of research problems. 2.2 Explain how to formulate clear research objectives.	• Explain the sources of research problems. • Explain how to formulate clear research objectives. • Explain the development	Textbooks, Journals, Internet, Articles, Projector, Computer,	• Formulate a research topic and state clear objectives • Formulate hypotheses for the	Guide students to: • Formulate a research topic and state clear objectives • Formulate hypotheses for the	Whiteboard, markers, worksheets, journals Students’ projects

	2.3 Explain the development of null and alternative hypotheses. 1.5 Explain experimental error	of null and alternative hypotheses. • Explain experimental error	Diagrams/charts, Marker board, Marker, Pictures, etc.	selected topic	selected topic	Internet Magazines Newspapers, practical manual.
General Objective 3.0: Understand the different types of research designs and sampling techniques.						
4-5	3.1 Explain research design 3.2 State examples of research design 3.3 Explain the merits and demerits of various research design 3.4 Define population, sample, and sampling 3.5 Explain sampling techniques (Random, Stratified, Systematic, etc) 3.6 Explain the advantages and disadvantages of each type of sampling	• Explain research design • Describe the merits and demerits of various research design • Discuss population, sample, and sampling • Discuss sampling techniques (Random, Stratified, Systematic, etc) • Discuss the advantages and disadvantages of each type of sampling	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	• Carry out research and select appropriate design for the study. • Take representative sample of the study population and use it to generalize findings	Guide students to: • Carry out a research and select appropriate design for the study. • Take representative sample of the study population and use it to generalize findings	Projector Text book Internet Lecture notes Charts Pictures Whiteboard Marker, seeds of different colors, sampling frames, calculators, practical manual.
General Objective 4.0: Comprehend the methods of data collection in agricultural research						
6-7	4.1 Explain types of data 4.2 Explain methods of data	• Explain types of data and methods of data (Primary vs. Secondary, Qualitative vs. Quantitative).	Lecture notes Internets Whiteboards Marker Charts	• Design a simple questionnaire. • Record data of	Guide student to: • Design a simple questionnaire.	Sample questionnaires, measuring tapes, field

	4.3 Explain tools used for data collection.	Explain tools used for data collection (Questionnaires, Interviews, Observations, Field measurements etc)		selected parameters	Record data of selected parameters	notebooks. Scales Vernier calipers
General Objective 5.0: Understand the basic principles of experimental design						
8-9	5.1 Explain the principles of Replication, Randomization, and Local Control. 5.2 Describe Completely Randomized Design (CRD). 5.3 Describe Randomized Complete Block Design (RCBD)	- Discuss the principles of Replication, Randomization, and Local Control. - Describe Completely Randomized Design (CRD). - Describe Randomized Complete Block Design (RCBD)	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	- Mark out the field, the plan and the pegging - Layout a simple RCBD experiment in the field - Layout out a simple CRD experiment in the greenhouse or laboratory - Use a random number table or drawing lots to assign treatments to plots.	Guide students to: - Mark out the field, the plan and the pegging - Lay out a simple RCBD experiment in the field - Layout out a simple CRD experiment in the greenhouse or laboratory - Use a random number table or drawing lots to assign treatments to plots.	Pegs, ropes, measuring tapes, polybags, Petri dishes, random number tables. Tags, practical manual
General objective: 6.0 Understand the methods of data processing and analysis using descriptive and inferential statistics						
10-11	6.1 Explain Descriptive Statistics (Mean, Median, Mode, Standard Deviation). 6.2 Explain Inferential Statistics (t-test, ANOVA, chi-	- Discuss Descriptive Statistics (Mean, Median, Mode, Standard Deviation). - Describe Inferential Statistics (t-test, ANOVA, chi-square). - Discuss levels of significance (P-values).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.	- Collect data for the experiment - Perform a manual t-test to compare two treatment means.	Guide students to: - Collect data for the experiment - Perform a manual t-test to compare two treatment means	Scientific calculators, statistical tables. Computer, practical manual.

	square). 6.3 Explain levels of significance (P-values).					
General Objective: 7.0 Understand how to use modern digital tools and software for data analysis						
12-13	7.1 Explain spreadsheets (Excel/Google Sheets) for data entry 7.2 Explain the use of basic functions and formulas. 7.3 Explain how to Create charts and graphs.	• Discuss the use of MS Excel and other software in data analysis. • Explain the use of basic functions and formulas in spreadsheet • Explain the use of charts and graphs (Bar, Line, Pie)	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Computer with necessary software application, etc.	• Demonstrate data entry and chart creation using a projector. • Enter field data into a spreadsheet. • Create a bar chart comparing yields and a line graph showing growth over time. • Use Excel functions (AVERAGE, STDEV, ANOVA) to analyze data.	Guide students to: • Enter field data into a spreadsheet. • Create a bar chart comparing yields and a line graph showing growth over time. • Use Excel functions (AVERAGE, STDEV, ANOVA) to analyze data.	Computers, spreadsheet software, LCD projector, practical manual.
General objective: 8.0 Know the principles of research reporting and technical writing						
14-15	8.1 Explain the reporting and report writing. 8.2 Explain the structure of a research report. 8.3 Explain referencing styles (APA, Chicago, etc).	• Explain the reporting and report writing. • Explain the structure of a research report using the following format: Project Title, Acknowledgement, Abstract, Table of contents, List of tables, charts/figures, etc. • Explain list of abbreviations,	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Published Journal articles, samples	• Report the outcome of research based on the agreeable headings • Interpret results • Practice citing sources using the APA format	Guide students to: • Report the outcome of research based on the agreeable headings • Interpret results. • Practice citing sources using the APA format	Sample research reports, Published Journal articles, APA style guides.

		Introduction, Literature review- Material and method/ Methodology, Results, Discussion, Conclusion and Recommendation, References Appendixes • Explain referencing styles (APA, Chicago, etc).	of past students' projects, APA style guides, etc.			
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

CROP PRODUCTION AND PRECISION FARMING

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: CROP PRODUCTION AND PRECISION FARMING	COURSE CODE: AGT 211	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is design to equip students with knowledge and skills in crop production, precision agriculture, and modern farming technologies for efficient and sustainable crop management.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand crop production techniques and precision farming concepts; 2.0 Understand modern crop establishment and management practices; 3.0 Understand precision nutrient and water management techniques; 4.0 Understand integrated pest and disease management strategies; 5.0 Understand harvesting, yield optimization and digital monitoring techniques.		



PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: CROP PRODUCTION AND PRECISION FARMING			COURSE CODE: AGT 211		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is design to equip students with knowledge and skills in crop production, precision agriculture, and modern farming technologies for efficient and sustainable crop management.						
GENERAL OBJECTIVE 1.0: Understand crop production techniques and precision farming concepts						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Explain concepts of crop production systems and intensification strategies 1.2 Explain principles of precision agriculture and site-specific crop management 1.3 Explain components of precision farming 1.4 Explain variability in soil and crop performance within a field 1.5 Describe role of data-driven decision-making in	• Discuss concepts of crop production systems and intensification strategies • Describe principles of precision agriculture and site-specific crop management • Explain components of precision farming (GPS, sensors, drones, data systems, etc) • Describe variability in soil and crop performance within a field • Describe role of data-driven decision-	Textbooks, Journals, Internet, Projector, Computer, Diagrams/chart s, Marker board, Marker, Pictures, GPS devices, Case studies, etc.	•Demonstrate the use of basic precision farming tools (GPS/mobile apps, etc) •Map simple field plots using GPS coordinates •Record variability in soil/crop performance across plots •Collect field data for precision analysis (yield, soil condition) •Classify field zones based on observed variability •Interpret simple spatial data for decision-making	Guide students to: •Demonstrate the use of basic precision farming tools (GPS/mobile apps, etc) •Map simple field plots using GPS coordinates •Record variability in soil/crop performance across plots •Collect field data for precision analysis (yield, soil condition) •Classify field zones based on observed	GPS devices, mobile apps, field plots, measuring tools, practical manual

	crop production 1.6 Explain concepts of yield mapping and field zoning 1.7 Describe advantages and limitations of precision agriculture in developing countries 1.8 Explain relationship between precision farming and sustainable agriculture 1.9 Explain challenges in adoption of precision farming technologies	making in crop production • Discuss concepts of yield mapping and field zoning • Describe advantages and limitations of precision agriculture in developing countries • Discuss relationship between precision farming and sustainable agriculture • Discuss challenges in adoption of precision farming technologies			variability • Interpret simple spatial data for decision-making	
General Objective 2.0: Understand modern crop establishment and management practices						
4 – 6	2.1 Explain land preparation techniques (minimum tillage, conservation tillage, mechanised systems etc) 2.2 Describe improved seed selection, treatment and certification standards 2.3 Explain precision	• Discuss land preparation techniques (minimum tillage, conservation tillage, mechanised systems etc) • Describe improved seed selection, treatment and certification standards • Describe precision planting techniques (row spacing, plant	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Improved	• Prepare land using appropriate method (manual/mechanised demonstration) • Treat seeds using recommended practices • Plant crops using correct spacing and planting techniques • Use simple tools/apps to monitor crop growth • Conduct field scouting and record observations	Guide students to: • Prepare land using appropriate method (manual/mechanised demonstration) • Treat seeds using recommended practices • Plant crops using correct spacing and planting techniques • Use simple tools/apps to	Farm tools, seeds, herbicides (demo), measuring tools, mobile apps, field plots, practical manual.

	planting techniques (row spacing, plant population, depth control etc) 2.4 Describe the use of modern planting equipment and technologies 2.5 Explain crop establishment under different ecological zones 2.6 Describe crop growth monitoring techniques (field scouting, digital monitoring tools) 2.7 Explain use of sensors and digital tools in monitoring crop growth 2.8 Explain crop stand management and supplying techniques 2.9 Describe weed management strategies in modern crop systems (mechanical, chemical, integrated, etc) 2.10 Explain role of	population, depth control etc) • Describe the use of modern planting equipment and technologies • Discuss crop establishment under different ecological zones • Describe crop growth monitoring techniques (field scouting, digital monitoring tools) • Explain use of sensors and digital tools in monitoring crop growth • Discuss crop stand management and supplying techniques • Describe weed management strategies in modern crop systems (mechanical, chemical, integrated, etc) • Describe role of climate-smart practices in crop establishment	seeds Planting guides Digital tools, etc.	• Apply weed control methods (manual/mechanical/chemical demonstration) • Carry out supplying and stand correction practices	monitor crop growth • Conduct field scouting and record observations • Apply weed control methods (manual/mechanical/chemical demonstration) • Carry out supplying and stand correction practices	
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	climate-smart practices in crop establishment					
General Objective 3.0: Understand precision nutrient and water management techniques						
7 – 9	3.1 Explain principles of precision nutrient management 3.2 Describe soil fertility variability and nutrient mapping techniques 3.3 Explain use of soil testing and digital soil data in fertilizer decisions 3.4 Describe variable rate fertilizer application (VRA) techniques 3.5 Explain integrated nutrient management 3.6 Describe irrigation systems 3.7 Explain precision irrigation scheduling and water-use efficiency 3.8 Describe use of sensors in soil moisture and nutrient monitoring	• Discuss principles of precision nutrient management (site-specific application) • Describe soil fertility variability and nutrient mapping techniques • Discuss use of soil testing and digital soil data in fertilizer decisions • Describe variable rate fertilizer application (VRA) techniques • Discuss integrated nutrient management (organic + inorganic sources) • Describe irrigation systems (drip, sprinkler, surface irrigation) • Discuss precision irrigation scheduling and water-use efficiency • Discuss use of sensors	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Soil Test Kits, Fertilizer Samples, Irrigation, Sensors, etc.	• Collect soil samples for nutrient status • Analyze soil samples for nutrient status • Apply fertilizers using recommended rates • Demonstrate irrigation methods (drip/sprinkler where possible) • Monitor soil moisture using simple tools/sensors • Carry out recording and interpretation of nutrient and water management data • Perform comparative analysis of crop response under different treatments	Guide students to: • Collect soil samples for nutrient status • Analyze soil samples for nutrient status • Apply fertilizers using recommended rates • Demonstrate irrigation methods (drip/sprinkler where possible) • Monitor soil moisture using simple tools/sensors • Carry out recording and interpretation of nutrient and water management data • Compare crop response under different treatments	Soil kits, fertilizers, irrigation tools, sensors, field plots, practical manual.

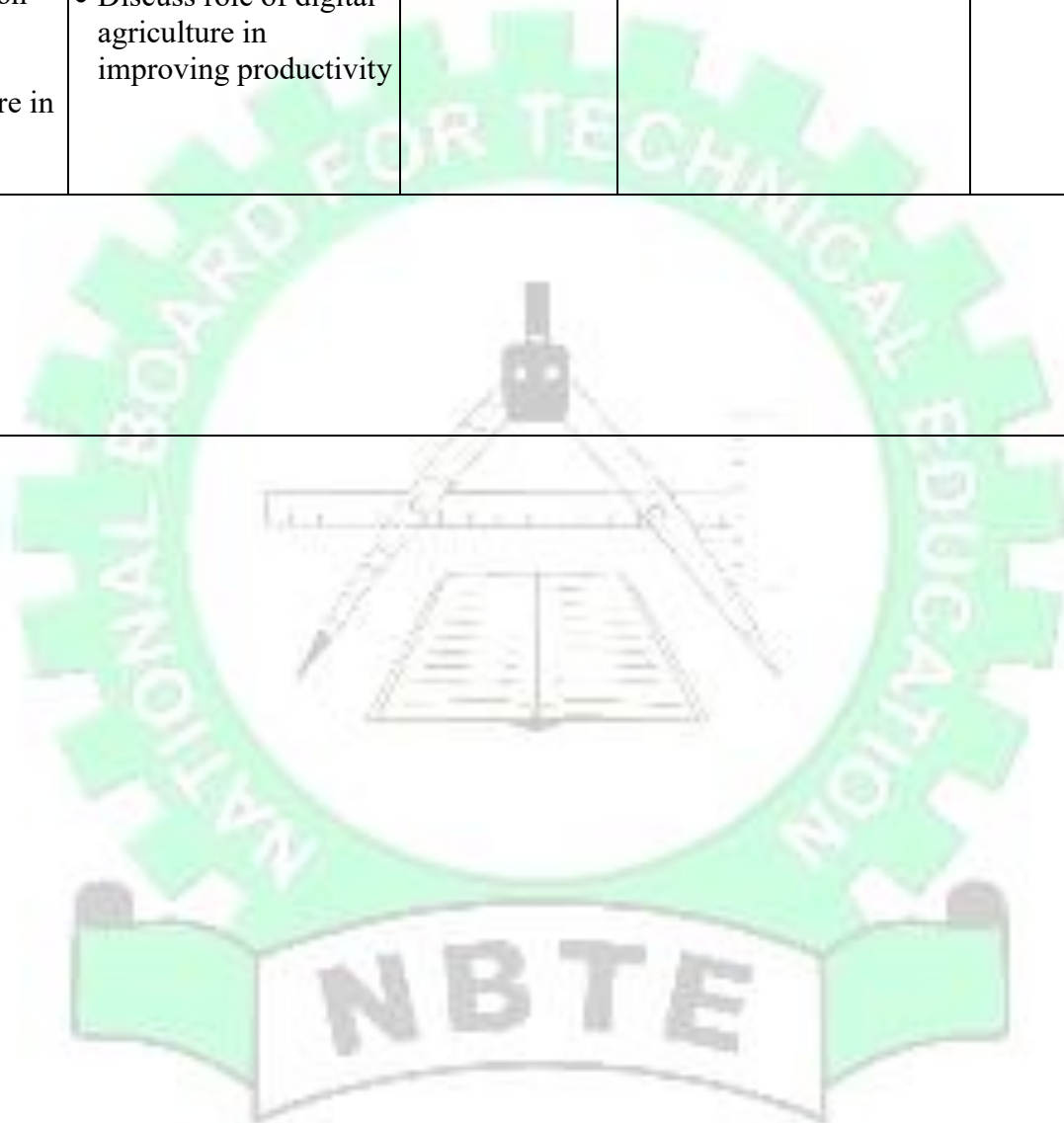
	3.9 Explain environmental implications of poor nutrient and water management	- in soil moisture and nutrient monitoring • Discuss environmental implications of poor nutrient and water management				
General Objective 4.0: Understand integrated pest and disease management strategies						
10 – 12	4.1 Explain principles of Integrated Pest Management (IPM) 4.2 States major crop pests and diseases and their economic importance 4.3 Describe pest and disease monitoring techniques 4.4 Explain threshold levels and decision-making in pest control 4.5 Describe control methods 4.6 Explain safe use of pesticides and environmental considerations 4.7 Describe role of digital tools in pest monitoring and forecasting 4.8 Explain resistance	• Discuss principles of Integrated Pest Management (IPM) • Explain major crop pests and diseases and their economic importance • Discuss pest and disease monitoring techniques (field scouting, traps, etc) • Discuss threshold levels and decision-making in pest control • Describe control methods (cultural, biological, chemical, mechanical) • Discuss safe use of pesticides and environmental considerations • Explain role of digital tools in pest monitoring and	Textbooks, Journals, Internet, Projector, Computer, Diagrams/ charts, Marker board, Marker, Pictures, Videos Pest Samples Traps Pesticides (Demo) Apps	• Identify pests and disease symptoms in field plots • Conduct field scouting and pest monitoring • Set up simple pest traps • Apply control measures appropriately (demonstration) • Use mobile tools/apps for pest identification • Record pest incidence and management actions	Guide students to: • Identify pests and disease symptoms in field plots • Conduct field scouting and pest monitoring • Set up simple pest traps • Apply control measures appropriately (demonstration) • Use mobile tools/apps for pest identification • Record pest incidence and management actions	Field plots, traps, PPE, pesticides, mobile apps, practical manual.

	management strategies 4.9 Describe integrated disease management practices	forecasting • Discuss resistance management strategies • Explain integrated disease management practices				
General Objective 5.0: Know harvesting, yield optimization and digital monitoring techniques						
13 – 15	5.1 Explain harvesting techniques and timing for different crops 5.2 Describe factors affecting crop yield and productivity 5.3 Explain yield estimation and yield mapping techniques 5.4 Describe post-harvest handling and loss reduction strategies 5.5 Explain use of digital tools in yield monitoring and data recording 5.6 Describe precision harvesting and mechanised systems 5.7 Explain quality control and grading standards 5.8 Describe data-driven	• Discuss harvesting techniques and timing for different crops • Discuss factors affecting crop yield and productivity • Describe yield estimation and yield mapping techniques • Discuss post-harvest handling and loss reduction strategies • Describe use of digital tools in yield monitoring and data recording • Describe precision harvesting and mechanised systems • Discuss quality control and grading standards • Describe data-driven yield optimization strategies	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Crop samples Digital tools, etc.	• Harvest crops using appropriate techniques • Estimate crop yield using sampling methods • Record yield data using digital tools/spreadsheets • Carry out sorting, grading and handling off harvested produce • Analyze yield data for decision-making • Produce a report comparing yield results across plots	Guide students to: • Harvest crops using appropriate techniques • Estimate crop yield using sampling methods • Record yield data using digital tools/spreadsheets • Carry out sorting, grading and handling off harvested produce • Analyze yield data for decision-making • Compare yield results across plots	Farm produce, weighing scales, mobile apps, spreadsheets, practical manual.

	yield optimization strategies 5.9 Explain role of digital agriculture in improving productivity	Discuss role of digital agriculture in improving productivity				
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COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	100%



ANIMAL PRODUCTION II (RUMINANTS)

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ANIMAL PRODUCTION II (RUMINANTS)	COURSE CODE: AGT 212	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills required for the efficient production and management of ruminant animals.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the classification and breeds of ruminant animals; 2.0 Know the economic importance of the ruminant industry; 3.0 Comprehend the unique digestive system and nutrition of ruminants; 4.0 Understand housing, fencing, and equipment for ruminant production; 5.0 Understand routine management practices for cattle, sheep, and goats; 6.0 Know pasture and forage management; 7.0 Understand health management and disease control in ruminants; 8.0: Know breeding, reproduction and production efficiency techniques; 9.0 Know the processing and marketing of ruminant products.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ANIMAL PRODUCTION II (RUMINANTS)			COURSE CODE: AGT 212		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
GOAL: This course is designed to equip students with knowledge and skills required for the efficient production and management of ruminant animals.						
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GENERAL OBJECTIVE 1.0: Understand the classification and breeds of ruminant animals						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Define ruminant animals. 1.2 Explain common breeds of cattle, sheep, and goats in Nigeria. 1.3 Explain the classification ruminants by purpose.	• Explain ruminant animals (Large and Small). • Discuss common breeds of cattle, sheep, and goats in Nigeria. • Discuss the classification ruminants by purpose (Dairy, Beef, Dual-purpose).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Live animals, Breed, LCD projector, etc.	• Identify breeds using live animals or photographs. • Identify live animals (if available) or high-quality images/videos of various ruminant breeds, noting distinguishing features. • Practice assessing body condition scores for cattle, sheep, and goats. • Practice ear tagging, tattooing, and branding (simulated) for animal identification.	Guide students to: • Identify breeds using live animals or photographs. • Identify live animals (if available) or high-quality images/videos of various ruminant breeds, noting distinguishing features. • Practice assessing body condition scores for cattle, sheep, and goats. • Practice ear tagging, tattooing, and branding (simulated) for	Live animals, breed charts, LCD projector, ear tags, tattoo kits, branding irons (simulated), practical manual.

					animal identification.	
GENERAL OBJECTIVE 2.0: Know the economic importance of the ruminant industry.						
3	2.1 Explain the role of ruminants in the national economy. 2.2 Explain primary products and by-products. 2.3 Describe the value chain in the ruminant industry. 2.4 Outline the challenges and opportunities of ruminant industry in Nigeria.	• Discuss the role of ruminants in the national economy. • Discuss primary products (meat, milk, hides) and by-products (manure, bones etc). • Describe the value chain in the ruminant industry. • Discuss the challenges and opportunities of ruminant industry in Nigeria.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/chart s, Marker board, Marker, Pictures, Videos Market data, survey tools, etc.	• Visit local market or processing plant to identify ruminant products, pricing, and demand. • Map out the value chain for a specific ruminant product (e.g., milk or beef) from farm to consumers. • Develop a simple cost-benefit analysis for a small-scale ruminant enterprise. • Write technical report.	Guide students to: • Visit local market or processing plant to identify ruminant products, pricing, and demand. • Map out the value chain for a specific ruminant product (e.g., milk or beef) from farm to consumers. • Develop a simple cost-benefit analysis for a small-scale ruminant enterprise. • Write technical report.	Market data, survey tools, case studies, basic accounting templates, practical manual.
GENERAL OBJECTIVE 3.0: Comprehend the unique digestive system and nutrition of ruminants.						
4-5	3.1 Describe the four-compartment stomach. 3.2 Explain the process of rumination. 3.3 Explain types of ruminant feeds. 3.4 Discuss the concept of precision feeding.	• Discuss the four-compartment stomach (Rumen, Reticulum, Omasum, Abomasum). • Explain the process of rumination.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/chart s, Marker board, Marker,	• Identify parts of a ruminant digestive tract (from a slaughtered animal or model). • Identify various feed ingredients (e.g., hay, silage, concentrates). • Carry out calculation and formulation of	Guide students to: • Identify parts of a ruminant digestive tract (from a slaughtered animal or model). • Identify various feed ingredients (e.g., hay, silage,	Digestive system models/spe cimens, feed samples, weighing scales, feed

		• Explain types of ruminant feeds (Roughages, Concentrates, Supplements etc). • Discuss the concept of precision feeding.	Pictures, Videos Digestive system models, feed samples, etc.	simple feed rations for different ruminant categories (e.g., lactating cow, growing lamb). • Use software or tables to balance a ruminant ration based on nutrient requirements.	concentrates). • Calculate and formulate simple feed rations for different ruminant categories (e.g., lactating cow, growing lamb). • Use software or tables to balance a ruminant ration based on nutrient requirements.	formulation software/tables. Computer, Practical manual.
GENERAL OBJECTIVE 4.0: Understand housing, fencing, and equipment for ruminant production.						
6-7	4.1 Explain site selection and orientation. 4.2 Describe types of housing. 4.3 Describe essential equipment.	• Explain site selection and orientation. • Describe types of housing (Kraals, Paddock systems, Stanchion barns etc.). • Discuss essential equipment (Milking machines, Feed bunks, Waterers etc.).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, etc.	• Sketch detailed farm layouts for ruminant operations, including housing, paddocks, handling facilities etc. • Participate in the construction of a simple fence or repair of existing fencing. • Demonstrate the use and maintenance of essential equipment (e.g., feed bunks, water troughs, simple milking equipment).	Guide students to: • Sketch detailed farm layouts for ruminant operations, including housing, paddocks, handling facilities etc. • Participate in the construction of a simple fence or repair of existing fencing. • Demonstrate the use and maintenance of essential equipment (e.g., feed bunks, water troughs,	Building materials, fencing tools. Feeding troughs, practical manual.

					simple milking equipment).	
GENERAL OBJECTIVE 5.0: Understand routine management practices for cattle, sheep, and goats.						
8-9	5.1 Explain routine tasks: Identification, Castration, Dehorning etc. 5.2 Explain dairy management and milking procedures. 5.3 Describe management of young ruminants.	• Explain routine tasks: Identification (Tagging, Branding, notching etc), Castration, Dehorning etc • Explain dairy management and milking procedures. • Describe management of young ruminants (Calves, Lambs, Kids).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/chart s, Marker board, Marker, Pictures, Videos Ear tags, castrators, dehorner, grooming kits, etc.	• Practice safe and humane handling and restraint techniques for cattle, sheep, and goats. • Practice the following under supervision: - Castration. - Dehorning. - Hoof Trimming. - Milking. - Calf/Lamb/Kid Management.	• Practice safe and humane handling and restraint techniques for cattle, sheep, and goats. • Practice the following: - Castration: Demonstration and simulated practice of different methods (e.g., Burdizzo, elastrator). - Dehorning: Demonstration and simulated practice of dehorning methods (e.g., hot iron, caustic paste). - Hoof Trimming: Practice proper hoof trimming	Live animals, Handling chutes, ropes, Burdizzo, elastrators, dehorner, hoof trimmers, milking buckets/machines, colostrum replacers, iodine, practical manual.

					techniques for sheep and goats. iv. Milking: Practice manual and machine milking procedures, emphasizing hygiene. v. Calf/Lamb/Kid Management: Practice colostrum feeding, navel dipping, and basic health checks for young stock.	
GENERAL OBJECTIVE 6.0: Know pasture and forage management.						
10	6.1 Define pasture and forage crops. 6.2 Explain grazing systems (Rotational, Continuous, Zero-grazing). 6.3 Explain pasture establishment and maintenance.	• Discuss the importance of legumes and grasses in a pasture. • Discuss pasture establishment and maintenance	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Forage samples, field	• Identify common pasture grasses and legumes in the field. • Assess pasture quality and quantity (e.g., using a quadrat). • Design a rotational grazing system for a given paddock size and animal number. • Participate in planting forage seeds or	Guide students to: • Identify common pasture grasses and legumes in the field. • Assess pasture quality and quantity (e.g., using a quadrat). • Design a rotational grazing system for a given	Forage samples, field guides, quadrat, measuring tape, seeds, basic farm tools, practical manual.

			guides, etc.	establishing a small pasture plot.	paddock size and animal number. • Participate in planting forage seeds or establishing a small pasture plot.	
GENERAL OBJECTIVE 7.0: Understand health management and disease control in ruminants.						
11-12	7.1 Describe signs of health and illness. 7.2 Explain the major diseases of ruminants (Foot and Mouth, CBPP, PPR, Anthrax). 7.3 Explain parasite control.	• Discuss vaccination schedules and biosecurity. • Discuss the major diseases of ruminants (Foot and Mouth, CBPP, PPR, Anthrax). • Discuss parasite control (Internal and External).	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Drenching guns, sprayers, thermometers, vaccines, etc.	• Identify signs of common diseases in ruminants (using images/videos or live animals if available). • Collect fecal, blood, and tissue samples for diagnostic purposes (simulated). • Administer oral drenches, subcutaneous, and intramuscular injections. • Set up biosecurity protocols (e.g., footbaths, disinfection procedures, quarantine). • Carry out dipping or spraying for external parasites and administer anthelmintics for internal parasites.	Guide students to: • Identify signs of common diseases in ruminants (using images/videos or live animals if available). • Collect fecal, blood, and tissue samples for diagnostic purposes (simulated). • Administer oral drenches, subcutaneous, and intramuscular injections. • Set up and demonstrate biosecurity protocols (e.g., footbaths, disinfection	Live animals Vaccines, syringes, needles, drenching guns, sprayers, thermometers, stethoscope, sample collection kits, PPE, disinfectants, practical manual.

					procedures, quarantine). • Carry out dipping or spraying for external parasites and administer anthelmintics for internal parasites.	
GENERAL OBJECTIVE 8.0: Know breeding, reproduction and production efficiency techniques						
13 – 14	8.1 Explain reproductive physiology in livestock 8.2 Describe estrus detection and breeding timing 8.3 Explain artificial insemination (AI) and modern breeding techniques 8.4 Describe gestation, parturition and neonatal care 8.5 Explain factors affecting reproductive efficiency 8.6 Describe production efficiency indicators (fertility rate, growth rate, yield etc) 8.7 Explain record-based breeding management 8.8 Describe genetic improvement strategies	• Discuss reproductive physiology in livestock • Describe estrus detection and breeding timing • Discuss artificial insemination (AI) and modern breeding techniques • Describe gestation, parturition and neonatal care • Discuss factors affecting reproductive efficiency • Describe production efficiency	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, Breeding records, etc.	• Identify signs of heat in animals • Assist in breeding operations (where possible) • Record breeding and reproductive data • Monitor reproductive performance • Evaluate production efficiency using records • Apply basic neonatal care practices	Guide students to: • Identify signs of heat in animals • Assist in breeding operations (where possible) • Record breeding and reproductive data • Monitor reproductive performance • Evaluate production efficiency using records • Apply basic neonatal care practices	Live animals Charts, diagrams, breeding records Videos, practical manual.

	in livestock production 8.9 Explain role of technology in improving reproduction efficiency	indicators (fertility rate, growth rate, yield etc.) • Discuss record-based breeding management • Describe genetic improvement strategies in livestock production • Discuss role of technology in improving reproduction efficiency				
GENERAL OBJECTIVE 9.0: Understand the processing and marketing of ruminant products						
15	9.1 Describe humane slaughtering and carcass evaluation. 9.2 Explain milk handling and hygiene. 9.3 Describe marketing strategies for ruminant products. 9.4 Explain meat handling and hygiene	• Explain humane slaughtering and carcass evaluation. • Discuss milk handling and hygiene. • Describe marketing strategies for ruminant products. • Discuss meat handling and hygiene	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, Milk, Milk testing kits,	• Carry out demonstration of humane slaughter • Participate in carcass evaluation (dressing percentage, meat cuts). • Carry out basic milk tests (e.g., lactometer for specific gravity, acidity test). • Demonstrate proper milk handling, cooling, and storage techniques. • Develop a marketing plan for ruminant	Guide students to: • Carry out demonstration of humane slaughter • Participate in carcass evaluation (dressing percentage, meat cuts). • Carry out basic milk tests (e.g., lactometer for specific gravity, acidity test).	Abattoir visit, milk testing kit, lactometer, processing equipment, packaging materials, market analysis tools, practical manual.

			Meat samples processing equipment, etc.	products, including branding, packaging, and sales channels.	• Demonstrate proper milk handling, cooling, and storage techniques. • Develop a marketing plan for ruminant products, including branding, packaging, and sales channels.	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

FARM RECORDS AND AGRIBUSINESS PLANNING

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: FARM RECORDS AND AGRIBUSINESS PLANNING	COURSE CODE: AGT 213	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with knowledge of basic farm management concepts, farm record-keeping, financial analysis and agribusiness planning.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand principles of farm management and decision-making techniques; 2.0 Understand basic farm costing, budgeting, record analysis, farm planning and financial management systems; 3.0 Understand agribusiness development, enterprise analysis and enterprise identification techniques; 4.0 Understand business planning, innovation, operations, risk management, business growth and financial management strategies.		



PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: FARM RECORDS AND AGRIBUSINESS PLANNING			COURSE CODE: AGT 213	CONTACT HOURS: 2 HOURS/WEEK		
			CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: II			PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge of basic farm management concepts, and farm record-keeping skills for effective decision-making in agricultural production and agribusiness.						
GENERAL OBJECTIVE 1.0: Understand principles of farm management and decision-making.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1– 3	1.1 Define farm management 1.2 Explain the importance of farm management in agricultural production 1.3 Describe functions of farm management 1.4 Explain types of farm decisions 1.5 Describe farm planning processes and enterprise selection 1.6 Explain risk and uncertainty in farm planning 1.7 Explain decision-making under risk and uncertainty in agriculture	• Explain farm management • Discuss the importance of farm management in agricultural production • Discuss functions of farm management (planning, organizing, directing, controlling) • Discuss types of farm decisions (what to produce, how to produce, how much to produce) • Describe farm planning processes and enterprise	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Case Examples, Board Illustrations, etc.	• Write a technical report on a study visit to a farm to observe and ask questions on planning, organizing, directing, controlling and decision making.	Guide students to: • Write a technical report on a study visit to a farm to observe and ask questions on planning, organizing, directing, controlling and decision making.	Farm Farm records Computer, practical manual.

	1.8 Describe tools used in farm decision-making (records, budgets, experience, market information etc.)	• selection • Discuss risk and uncertainty in farm planning • Discuss decision-making under risk and uncertainty in agriculture • Describe tools used in farm decision-making (records, budgets, experience, market information etc.)				
General Objective 2.0: Understand basic farm costing, budgeting, record analysis, farm planning and financial management systems						
4- 6	2.1 Define cost and revenue concepts 2.2 Describe types and importance of farm records 2.3 Explain farm budgeting techniques 2.4 Explain methods of analyzing farm records for decision-making 2.5 Describe cost-benefit analysis in agricultural production 2.6 Describe preparation of farm financial statements	• Explain cost and revenue concepts (fixed cost, variable cost, total cost, total revenue, gross margin, profit, loss) • Discuss types and importance of farm records (production, financial, labour, inventory etc.) • Discuss farm budgeting techniques (partial budget, simple enterprise budget) • Discuss methods of analyzing farm	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Sample Farm Records Calculators Board Illustrations, etc.			

	2.7 Explain use of digital tools in record keeping and decision-making based on records. 2.8 Describe cost tracking and financial monitoring 2.9 Discuss farm planning concepts and objectives 2.10 Describe types of farm plans.	records for decision-making • Describe cost-benefit analysis in agricultural production • Discuss preparation of farm financial statements (profit and loss, balance sheet, cash flow analysis and budgeting) • Describe the use of digital tools in record keeping and decision-making based on records. • Describe cost tracking and financial monitoring • Discuss farm planning concepts and objectives • Describe types of farm plans (whole farm, enterprise plan)				
General Objective 3.0: Understand agribusiness development, enterprise analysis and enterprise identification techniques						
7– 9	3.1 Explain agribusiness	• Discuss agribusiness concepts and value	Textbooks, Journals,	• Identify different Agribusiness	Guide students to: • Identify different	Agribusiness enterprises

	concepts and value chains. 3.2 Explain types of agricultural enterprises 3.3 Explain enterprise selection and evaluation 3.4 Describe value addition and processing 3.5 Explain business development strategies 3.6 Describe supply chain management in agriculture 3.7 Explain entrepreneurship skills in agribusiness 3.8 Describe Strength, Weakness Opportunity Threat (SWOT) analysis in enterprise planning 3.9 Explain scaling and diversification strategies 3.10 Explain value chains and market opportunities	chains (crop, livestock, processing, services etc) • Describe types of agricultural enterprises • Discuss enterprise selection and evaluation • Describe value addition and processing • Discuss business development strategies • Describe supply chain management in agriculture • Discuss entrepreneurship skills in agribusiness • Describe Strength, Weakness Opportunity Threat (SWOT) analysis in enterprise planning • Explain scaling and diversification strategies • Discuss value chains and market opportunities	Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Calculator, sample farm data, worked examples, etc.	enterprises within their community • Carry out Strength, Weakness Opportunity Threat (SWOT) analysis of the identified agribusiness enterprises	Agribusiness enterprises within their community • Carry out SWOT analysis of the identified agribusiness enterprises	within the community, practical manual.
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	3.11 Describe enterprise selection criteria	• Describe enterprise selection criteria (capital, market demand, risk)				
	3.12 Explain entrepreneurship concepts and characteristics	• Discuss entrepreneurship concepts and characteristics				
	3.13 Describe innovation and opportunity recognition	• Describe innovation and opportunity recognition				
	3.14 Explain feasibility analysis (conceptual)	• Discuss feasibility analysis (conceptual) and sustainability in enterprise development				
	3.15 Explain sustainability in enterprise development					
General Objective 4.0: Understand business planning, innovation, operations, risk management, business growth and financial management strategies						
10 – 12	4.1 Explain the components of a business plan	• Discuss the components of a business plan	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, Record books, Sample Data Sheets	• Identify the needs of targeted community	Guide students to:	Community books, sample data sheets, charts, calculators
	4.2 Describe financial planning	• Discuss financial planning (costing, budgeting, revenue projection) and sources of finance (loans, grants, savings)		• Propose solutions to satisfy the community needs	• Propose solutions to satisfy the community needs	sample business plan, practical manual.
	4.3 Explain sources of finance			• Prepare business plans on how to generate income from the solutions provided		
	4.4 Describe financial statements (income statement, cash flow)	• Describe financial statements (income statement, cash flow)		• Make presentations	• Prepare business plans on how to generate income	
	4.5 Explain pricing and cost analysis					
	4.6 Describe break-even					

	analysis (conceptual)	• Explain pricing and cost analysis • Describe break-even analysis (conceptual) • Explain use of digital tools in financial management • Describe risk in financial planning • Explain investment decision-making • Discuss innovation and technology adoption in agribusiness • Describe business risks and uncertainties • Describe risk management strategies (diversification, insurance) • Describe scaling and expansion strategies • Discuss business sustainability and resilience • Describe performance evaluation and improvement • Explain networking and partnerships • Explain access to	Charts, Calculators, etc.		from the solutions provided • Make presentations	
4.7	Explain use of digital tools in financial management					
4.8	Describe risk in financial planning					
4.9	Explain investment decision-making					
4.10	Explain innovation and technology adoption in agribusiness					
4.11	Describe business risks and uncertainties					
4.12	Explain risk management strategies (diversification, insurance)					
4.13	Describe scaling and expansion strategies					
4.14	Explain business sustainability and resilience					
4.15	Describe performance evaluation and improvement					
4.16	Explain networking and partnerships					
4.17	Describe access to					

	funding and investment opportunities	and partnerships				
4.18	Explain strategies for long-term growth	• Describe access to funding and investment opportunities • Discuss strategies for long-term growth				
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

DIGITAL AGRICULTURE AND DATA MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: DIGITAL AGRICULTURE AND DATA MANAGEMENT	COURSE CODE: AGT 214	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
Goal: This course is designed to equip students with knowledge and skills in the use of digital tools, data collection and management systems for agricultural production.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know digital tools for agricultural data collection and information management systems; 2.0 Understand data analysis, visualisation and decision-support tools in agriculture; 3.0 Understand GIS, remote sensing and spatial technologies in agriculture; 4.0 Know mobile and digital platforms for agricultural extension, advisory services and smart farm operations; 5.0 Understand digital technologies for farm management and decision-making.		



PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: DIGITAL AGRICULTURE AND DATA MANAGEMENT			COURSE CODE: AGT 214		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
Goal: This course is designed to equip students with knowledge and skills in the use of digital tools, data collection and management systems for agricultural production.						
General Objective 1.0: Know digital tools for agricultural data collection and information management systems.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Define agricultural data. 1.2 Explain the classification of agricultural data 1.3 Explain the importance of accurate, timely and complete data in farm planning, monitoring and evaluation. 1.4 Describe traditional vs. digital methods of data collection in agriculture, with their advantages and limitations.	• Explain agricultural data and its classification: production, soil, weather, financial, market and socio-economic data. • Explain the importance of accurate, timely and complete data in farm planning, monitoring and evaluation. • Describe traditional vs. digital methods of data collection in agriculture, with their advantages and	Computers, mobile devices, projector, sample farm datasets, internet access, digital data collection apps (Google Forms, ODK, KoBoCollect), Excel/Google Sheets, sample datasets with deliberate errors, cloud storage accounts, etc.	• Design a structured digital form to collect crop production data (variety, planting date, inputs, yield). • Collect simulated field data using a mobile form tool. • Enter collected data in a spreadsheet. • Organise collected data in a spreadsheet. • Carry out cleaning and validation of provided "dirty" agricultural dataset (correct errors, remove duplicates,	Guide students to: • Design a structured digital form to collect crop production data (variety, planting date, inputs, yield). • Collect simulated field data using a mobile form tool. • Enter collected data in a spreadsheet. • Organise collected data in a spreadsheet. • Carry out	Smartphones/tablets, computers, Google Forms or ODK, spreadsheet software, sample datasets. Excel/Google Sheets, prepared "dirty" datasets, cloud storage (Google Drive/OneDrive), practical manual.

1.5 Explain digital data collection tools 1.6 Explain data storage systems and their appropriate use. 1.7 Describe data cleaning, validation and management techniques. 1.8 Explain data quality dimensions. 1.9 Explain principles of data security, privacy and ethical use in agriculture. 1.10 Describe farm information management systems (FIMS) and database concepts. 1.11 Explain data workflows. 1.12 Describe challenges in agricultural data management in developing countries (connectivity, literacy, cost).	limitations. • Discuss digital data collection tools: mobile forms (Google Forms, ODK, KoBoCollect), GPS-enabled apps, IoT sensors. • Discuss data storage systems: spreadsheets, relational databases, cloud storage platforms (Google Drive, OneDrive) and their appropriate use. • Describe data cleaning, validation and management techniques: removing duplicates, correcting errors, standardising formats. • Discuss data quality dimensions: accuracy, completeness, consistency, timeliness and uniqueness. • Discuss principles of data security, privacy		standardise units). • Organise cleaned data in a well-structured spreadsheet with clear column headings. • Carry out storing and backing up of dataset secure on a cloud platform. • Apply password protection and sharing permissions to a cloud-stored dataset. • Create a simple farm record system with multiple linked sheets (crops, inputs, sales). • Document a complete data workflow for one farm enterprise.	cleaning and validation of provided "dirty" agricultural dataset (correct errors, remove duplicates, standardise units). • Organise cleaned data in a well-structured spreadsheet with clear column headings. • Carry out storing and backing up of dataset secure on a cloud platform. • Apply password protection and sharing permissions to a cloud-stored dataset. • Create a simple farm record system with multiple linked	
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		and ethical use in agriculture: password protection, access control, data ownership and responsible data sharing. • Describe farm information management systems (FIMS) and database concepts: records, fields, queries and reports. • Discuss data workflows: from collection through cleaning, storage, analysis and reporting. • Describe challenges in agricultural data management in developing countries (connectivity, literacy, cost).			sheets (crops, inputs, sales). • Document a complete data workflow for one farm enterprise.	
General Objective 2.0: Understand data analysis, visualisation and decision-support tools in agriculture.						
4 - 6	2.1 Explain the role of data analysis in agricultural	• Discuss the role of data analysis in agricultural decision-making and	Textbooks, Journals, Internet,	• Compute mean yield, cost per hectare and profit margin from a	Guide students to: • Compute mean yield, cost per	Computers, Excel/Google Sheets, farm yield

	decision-making and farm performance evaluation. 2.2 Describe basic statistical concepts applied to agriculture. 2.3 Explain the use of spreadsheet tools for agricultural data analysis. 2.4 Describe data visualisation techniques and their agricultural applications. 2.5 Explain the interpretation of analysed agricultural data for farm management decisions (yield trends, input costs, profitability). 2.6 Explain the use of data in forecasting and planning farm activities.	farm performance evaluation. • Describe basic statistical concepts applied to agriculture: mean, median, mode, range, percentages, standard deviation and trend analysis. • Discuss the use of spreadsheet tools for agricultural data analysis: formulas, functions (SUM, AVERAGE, MAX, MIN, COUNT, IF), lookup functions and pivot tables. • Describe data visualisation techniques and their agricultural applications: bar charts, line graphs, pie charts, scatter plots and dashboards. • Discuss the interpretation of analysed agricultural data for farm	Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Excel/Google Sheets, sample farm yield and cost datasets, projector, etc.	provided crop production dataset. • Use SUM, AVERAGE, MAX, MIN and IF functions on a farm dataset. • Build a pivot table to summarise crop yields by season and location. • Create bar, line and pie charts from a crop yield dataset. • Build a simple one-page farm performance dashboard (yield, cost, profit). • Interpret chart trends • Identify at least two management decisions the data supports. • Calculate a 3-season moving average for crop yield data and project the next season. • Draft a short (1-page) analytical farm report	hectare and profit margin from a provided crop production dataset. • Use SUM, AVERAGE, MAX, MIN and IF functions on a farm dataset. • Build a pivot table to summarise crop yields by season and location. • Create bar, line and pie charts from a crop yield dataset. • Build a simple one-page farm performance dashboard (yield, cost, profit). • Interpret chart trends • Identify at least two management decisions the data supports.	datasets, projector, practical manual.
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	2.7 Describe common errors in data analysis (selection bias, outliers, incorrect formulas) and how to avoid them. 2.8 Explain simple forecasting concepts. 2.9 Explain reporting of analytical results. 2.10 Describe decision-support concepts in farming.	management decisions (yield trends, input costs, profitability). • Discuss the use of data in forecasting and planning farm activities. • Describe common errors in data analysis (selection bias, outliers, incorrect formulas) and how to avoid them. • Describe simple forecasting concepts: moving averages, trend projections and scenario analysis. • Discuss reporting of analytical results: structure of an analytical report, presenting data to farm managers, extension agents and investors. • Describe decision-support concepts in farming: linking data outputs to practical recommendations.		with at least two charts and three data-backed recommendations. • Present findings to class and respond to questions.	• Calculate a 3-season moving average for crop yield data and project the next season. • Draft a short (1-page) analytical farm report with at least two charts and three data-backed recommendations. • Present findings to class and respond to questions.	
General Objective 3.0: Understand GIS, remote sensing and spatial technologies in agriculture.						

7 – 9	3.1 Define GIS 3.2 Explain GIS four components. 3.3 Explain the role of GIS in agriculture. 3.4 Describe the Global Positioning System (GPS). 3.5 Explain spatial data types. 3.6 Describe remote sensing basics. 3.7 Explain applications of GIS and remote sensing in precision agriculture. 3.8 Describe map reading and interpretation techniques. 3.9 Explain the integration of GIS with other digital farm tools (farm management	• Explain GIS and its four components: hardware, software, data and people. • Discuss the role of GIS in agriculture: farm mapping, land-use planning, soil and crop analysis, yield zone delineation. • Describe the Global Positioning System (GPS): principles, accuracy, coordinate systems (latitude/longitude, UTM) and agricultural applications. • Discuss spatial data types: vector (points, lines, polygons) and raster (pixel grids, satellite images) data. • Describe remote sensing basics: electromagnetic spectrum, sensor types, satellite platforms (Landsat, Sentinel,	GPS devices/smartphones, computers, QGIS (free), sample maps, agricultural zone shapefiles, Landsat/Sentinel imagery, agricultural maps, projector. Case-study handouts, drone overview video, QGIS, etc.	• Collect GPS coordinates of 5 points on the campus using smartphones and record latitude/longitude. • Open a sample shapefile in QGIS, identify vector features (points/lines/polygons) and label them. • Identify a raster image (satellite imagery) in QGIS. • Download a free Sentinel-2 image tile covering a Nigerian agricultural area (via Copernicus Open Access Hub or EarthExplorer) and load it in QGIS. • Compute NDVI for the image and classify into vegetation density zones. • Read an agricultural map: identify scale, legend, crop zones and water bodies.	Guide students to: • Collect GPS coordinates of 5 points on the campus using smartphones and record latitude/longitude. • Open a sample shapefile in QGIS, identify vector features (points/lines/polygons) and label them. • Identify a raster image (satellite imagery) in QGIS. • Download a free Sentinel-2 image tile covering a Nigerian agricultural area (via Copernicus Open Access Hub or EarthExplorer) and load it in QGIS. • Compute NDVI for the image and	GPS-enabled smartphones, computers, QGIS, sample shapefiles, satellite imagery (Google Earth or QGIS plugin). Sentinel-2 imagery, agricultural maps, Raster Calculator instructions. Sketch farm maps, printer, plotting materials, practical manual.
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	systems, sensors, weather data). 3.10 Explain the role of spatial data in precision agriculture. 3.11 Describe benefits and limitations of GIS and spatial technologies for smallholder farmers in Nigeria. 3.12 Explain drone applications in agriculture.	Planet) and drone imagery concepts. • Discuss applications of GIS and remote sensing in precision agriculture: NDVI mapping, soil mapping, flood/drought monitoring, yield zone mapping. • Describe map reading and interpretation techniques: scale, legend, symbols and coordinate grids. • Discuss the integration of GIS with other digital farm tools (farm management systems, sensors, weather data). • Discuss the role of spatial data in precision agriculture: variable-rate application, management zones and site-specific crop management. • Describe benefits and limitations of GIS and spatial technologies for		• Digitise a simple farm layout from a sketch map: create polygon features for field boundaries and label with crop names in QGIS. • Overlay two layers (soil type + crop field) and identify management zones. • Prepare a simple farm map with title, north arrow, scale and legend for printing.	classify into vegetation density zones. • Read an agricultural map: identify scale, legend, crop zones and water bodies. • Digitise a simple farm layout from a sketch map: create polygon features for field boundaries and label with crop names in QGIS. • Overlay two layers (soil type + crop field) and identify management zones. • Prepare a simple farm map with title, north arrow, scale and legend for printing.	
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		smallholder farmers in Nigeria. • Discuss drone applications in agriculture: crop scouting, area measurement, spraying overview and legal framework in Nigeria.				
General Objective 4.0: Know mobile and digital platforms for agricultural extension, advisory services and smart farm operations.						
10 – 12	4.1 Explain the role of digital technologies in agricultural extension and knowledge dissemination. 4.2 Explain mobile platforms used in agricultural advisory. 4.3 Describe digital advisory services and decision-support platforms. 4.4 Explain benefits of digital extension. 4.5 Describe challenges in the	• Discuss the role of digital technologies in agricultural extension and knowledge dissemination. • Discuss mobile platforms used in agricultural advisory: apps (Farmcrowdy, Agrorite, Hello Tractor, Plantix), SMS services, interactive voice response (IVR), radio and social media. • Describe digital advisory services and decision-support platforms: e-extension portals, WhatsApp	Smartphones, internet, agricultural advisory apps (Plantix, Agrorite, etc.), projector, extension message samples, case-study handouts, , social media examples, ethical-use guidelines. IoT/drone videos, simulated sensor datasets, data-flow	• Download least two agricultural advisory apps; document key features and limitations. • Design a simple digital extension message (WhatsApp text + image) advising farmers on a seasonal crop management practice. • Share the message within a class WhatsApp group and evaluate peer responses. • Evaluate the credibility of five agricultural social	Guide students to: • Download least two agricultural advisory apps; document key features and limitations. • Design a simple digital extension message (WhatsApp text + image) advising farmers on a seasonal crop management practice. • Share the message within a	WhatsApp, selected agricultural apps, class WhatsApp group. internet, credibility rubric, video-editing app (CapCut/InShot – free versions). Computers/smartphones, sensor simulation datasets, NIMET/weather app, GPS app, campus map, practical manual.

	adoption of digital tools in rural areas. 4.6 Explain ethical issues in digital communication. 4.7 Describe the use of social media and online platforms in agriculture. 4.8 Explain the role of digital extension in climate-smart agriculture. 4.9 Explain smart farming concepts. 4.10 Discuss sensor applications in agriculture (conceptual level). 4.11 Describe drone applications in agriculture. 4.12 Explain data flow between smart devices and farm management platforms.	groups, YouTube agri-channels. • Discuss benefits of digital extension: speed, reach, accessibility, cost-efficiency and two-way communication. • Describe challenges in the adoption of digital tools in rural areas: connectivity gaps, digital literacy, cost of devices, language barriers and trust issues. • Discuss ethical issues in digital communication: misinformation, privacy, intellectual property and responsible information sharing. • Describe the use of social media and online platforms in agriculture: Facebook, YouTube, Instagram, Twitter/X, TikTok. • Discuss the role of digital extension in	diagram handout, smartphones, etc.	media posts (identify misinformation vs. accurate advice). • Create a short (60-second) voice note or short video clip advising on a climate-smart agricultural practice. • Present the clip to class and receive peer and teacher feedback. • Analyse a simulated 7-day soil-moisture sensor dataset: identify dry spells, compute daily average and recommend irrigation days. • Use a weather forecasting app (NIMET, Weather Underground) to plan a simulated spray operation (windspeed, rain risk). • Demonstrate GPS-based field	class WhatsApp group and evaluate peer responses. • Evaluate the credibility of five agricultural social media posts (identify misinformation vs. accurate advice). • Create a short (60-second) voice note or short video clip advising on a climate-smart agricultural practice. • Present the clip to class and receive peer and teacher feedback. • Analyse a simulated 7-day soil-moisture sensor dataset: identify dry spells, compute	
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		climate-smart agriculture: disseminating adaptation messages, weather alerts and seasonal outlooks. • Discuss smart farming concepts: Internet of Things (IoT), sensor networks, automation and their applications in Nigerian agriculture. • Discuss sensor applications in agriculture (conceptual level): soil moisture sensors, weather stations, livestock monitoring collars, irrigation controllers. • Describe drone applications in agriculture: field survey, crop scouting, pesticide spraying and area measurement. • Discuss data flow between smart devices and farm management platforms.		navigation using a smartphone mapping app.	daily average and recommend irrigation days. • Use a weather forecasting app (NIMET, Weather Underground) to plan a simulated spray operation (windspeed, rain risk). • Demonstrate GPS-based field navigation using a smartphone mapping app.	
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General Objective 5.0: Understand digital technologies for farm management and decision-making						
13 – 15	5.1 Explain the role of ICT in modern farm management. 5.2 Explain the digital tools used in farm planning and monitoring. 5.3 Describe decision-support systems (DSS) in agriculture. 5.4 Explain the use of weather information systems in farm decision-making. 5.5 Explain the use of market information systems in agricultural planning. 5.6 Describe performance indicators for farm management. 5.7 Explain data-driven planning and optimisation strategies: comparing	• Explain the role of ICT in modern farm management: record-keeping, planning, monitoring, reporting and traceability. • Discuss the digital tools used in farm planning and monitoring: farm management apps (Farmbrite, Farm ERP, local apps), spreadsheet templates and enterprise budgets. • Describe decision-support systems (DSS) in agriculture: what they are, how they work and examples (DSSAT, AquaCrop, CROPGRO). • Discuss the use of weather information systems in farm decision-making: NIMET seasonal outlook, TAMSAT rainfall data, weather alert services.	Computers, farm management spreadsheet template, AquaCrop (free), NIMET portal, projector, internet, AFEX/AgroMall portal, enterprise budget template, capstone project brief, digital farm plan template, projector, rubric, etc.	• Set up a digital farm record system for one crop enterprise (maize or rice) • Access the current NIMET seasonal rainfall outlook and document implications for planting date in one agro-ecological zone. • Run a simple AquaCrop simulation (using demo data) and interpret the yield output. • Access a market information platform (AFEX, AgroMall or Google for local commodity prices) and record current prices for maize, rice and cassava. • Calculate gross margin and ROI for one crop enterprise using a provided enterprise budget	Guide students to: • Set up a digital farm record system for one crop enterprise (maize or rice) • Access the current NIMET seasonal rainfall outlook and document implications for planting date in one agro-ecological zone. • Run a simple AquaCrop simulation (using demo data) and interpret the yield output. • Access a market information platform (AFEX, AgroMall or Google for local commodity prices) and record current	Computers, farm record template (Excel), AquaCrop, NIMET portal, internet, enterprise budget template, AFEX/AgroMall access, calculators, capstone template, , projector, marking rubric, practical manual, etc.

	enterprise budgets, optimising input use, timing sales to market price trends. 5.8 Describe reporting and documentation of farm performance for extension, credit access and investor reporting. 5.9 Describe challenges and limitations in the adoption of digital agriculture: infrastructure gaps, cost, skills shortage, electricity reliability, data ownership concerns. 5.10 Explain strategies to improve adoption of ICT in Nigerian agriculture: farmer training programmes, affordable device subsidies, local-language content, public-private partnerships.	• Discuss the use of market information systems in agricultural planning: AFEX, AgroMall, commodity price platforms, SMS price alert services. • Describe performance indicators for farm management: yield per hectare, cost of production, gross margin, return on investment (ROI) and break-even analysis. • Discuss data-driven planning and optimisation strategies: comparing enterprise budgets, optimising input use, timing sales to market price trends. • Describe reporting and documentation of farm performance for extension, credit access and investor reporting. • Describe challenges and limitations in the		template. • Identify the most profitable crop from three enterprise budgets and justify the choice with data. • Build a complete digital farm plan for an assigned enterprise (maize, poultry or fish). • Present the digital farm plan to class (10 minutes) with supporting charts and data. • Refine the digital plan based on feedback from teacher and peers. • Integrate all course competencies into a comprehensive digital farm plan (Capstone).	prices for maize, rice and cassava. • Calculate gross margin and ROI for one crop enterprise using a provided enterprise budget template. • Identify the most profitable crop from three enterprise budgets and justify the choice with data. • Build a complete digital farm plan for an assigned enterprise (maize, poultry or fish). • Present the digital farm plan to class (10 minutes) with supporting charts and data. • Respond to teacher and peer	
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	5.11 Explain continuous improvement using data feedback loops: monitoring KPIs, adjusting practices, seasonal learning cycles.	adoption of digital agriculture: infrastructure gaps, cost, skills shortage, electricity reliability, data ownership concerns. • Describe strategies to improve adoption of ICT in Nigerian agriculture: farmer training programmes, affordable device subsidies, local-language content, public-private partnerships. • Discuss continuous improvement using data feedback loops: monitoring KPIs, adjusting practices, seasonal learning cycles.			questions and refine the plan based on feedback. • Integrate all course competencies into a comprehensive digital farm plan (Capstone).	
COURSE ASSESSMENT:						
Course work: 10%						
Test/Assignments: 10%						
Practical: 40%						
Examination: 40%						
Total: 100%						

AGRICULTURAL MECHANIZATION AND SMART FARM SYSTEMS

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: AGRICULTURAL MECHANIZATION AND SMART FARM SYSTEMS	COURSE CODE: AGT 215	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in agricultural mechanization, operation and management of farm machinery, and application of smart technologies.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand mechanization principles and farm power systems; 2.0 Know how to operate and manage modern farm machinery and smart equipment; 3.0 Understand maintenance, diagnostics and servicing of agricultural machines; 4.0 Understand mechanised and precision field operations; 5.0 Understand smart farm systems, automation and digital technologies.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: AGRICULTURAL MECHANIZATION AND SMART FARM SYSTEMS			COURSE CODE: AGT 215		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
Year: II Semester: I			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in agricultural mechanization, operation and management of farm machinery, and application of smart technologies.						
GENERAL OBJECTIVE 1.0: Understand mechanization principles and farm power systems						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Explain concepts of agricultural mechanization and its role in modern farming 1.2 Explain farm power sources 1.3 Explain engine principles (IC engines) and power transmission systems 1.4 Describe tractor systems and components. 1.5 Explain power efficiency and energy utilization in farm operations 1.6 Describe mechanization levels in agriculture.	• Describe concepts of agricultural mechanization and its role in modern farming • Discuss farm power sources (human, animal, mechanical, electrical, renewable energy) • Explain engine principles (IC engines) and power transmission systems • Describe tractor systems and components (engine, transmission, hydraulics etc.)	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Computers Engine Models, Tractors, etc.	• Identify components of tractor and engine systems • Demonstrate basic operation of power equipment • Observe power transmission mechanisms • Compare performance of different power sources • Record observations of machine performance	Guide students to: • Identify components of tractor and engine systems • Demonstrate basic operation of power equipment • Observe power transmission mechanisms • Compare performance of different power sources • Record observations of machine	Tractor, engine models, tools, practical manual.

	1.7 Explain role of renewable energy (solar, biogas) in agriculture 1.8 Explain economic and environmental implications of mechanization 1.9 Explain selection criteria for farm power and machinery	• Discuss power efficiency and energy utilization in farm operations • Describe mechanization levels in agriculture (low, intermediate, high) • Discuss role of renewable energy (solar, biogas) in agriculture • Describe economic and environmental implications of mechanization • Discuss selection criteria for farm power and machinery			performance	
General Objective 2.0: Know how to operate and manage modern farm machinery and smart equipment						
4 - 6	2.1 Explain modern farm machinery. 2.2 Describe the functions and working principles of farm equipment 2.3 Explain machine calibration and adjustment techniques 2.4 Describe automated and precision machinery systems 2.5 Explain factors	• Explain modern farm machinery (ploughs, planters, harvesters, sprayers) • Describe the functions and working principles of farm equipment • Discuss machine calibration and adjustment techniques	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures,	• Operate farm machinery under supervision • Calibrate sprayers and planters • Adjust equipment for different operations • Demonstrate safe machine handling • Record machine performance data • Operate farm	Guide students to: • Operate farm machinery under supervision • Calibrate sprayers and planters • Adjust equipment for different operations • Demonstrate	Machinery, tools, PPE, practical manual.

	affecting machine performance and efficiency 2.6 Describe safe operation procedures for machinery 2.7 Explain integration of digital technologies in machinery (GPS-guided systems) 2.8 Describe smart farm equipment and sensors 2.9 Explain machine scheduling and operation planning	• Describe automated and precision machinery systems • Discuss factors affecting machine performance and efficiency • Describe safe operation procedures for machinery • Discuss integration of digital technologies in machinery (GPS-guided systems) • Describe smart farm equipment and sensors • Discuss machine scheduling and operation planning	Videos Computers Farm machinery Manuals	machinery such as tractor driving and mounted implement under supervision.	safe machine handling • Record machine performance data • Hands-on experience on machines operation including tractor driving and mounted implement	
General Objective 3.0: Understand maintenance, diagnostics and servicing of agricultural machines						
7 – 9	3.1 Explain preventive and corrective maintenance systems 3.2 Describe servicing schedules and maintenance planning 3.3 Explain common machine faults and causes 3.4 Explain diagnostic	• Discuss preventive and corrective maintenance systems • Describe servicing schedules and maintenance planning • Discuss common machine faults and causes • Describe diagnostic	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board,	• Perform routine maintenance (cleaning, lubrication, tightening) • Troubleshoot machine faults • Carry out simple repairs and servicing • Maintain service records	Guide students to: • Perform routine maintenance (cleaning, lubrication, tightening) • Troubleshoot machine faults • Carry out simple repairs and	Tools, machinery, lubricants Digital Diagnostic kits, practical manual.

	techniques for machinery 3.5 Describe lubrication systems and maintenance procedures 3.6 Explain economic implications of machine downtime 3.7 Describe use of digital tools in machine diagnostics 3.8 Explain spare parts management and inventory 3.9 Describe maintenance record keeping systems	techniques for machinery • Describe lubrication systems and maintenance procedures • Discuss economic implications of machine downtime • Describe use of digital tools in machine diagnostics • Discuss spare parts management and inventory • Describe maintenance record keeping systems	Marker, Pictures, Videos Computers Tools, lubricants, Manuals, etc.	• Use diagnostic tools where available	servicing • Maintain service records • Use diagnostic tools where available	
General Objective 4.0: Understand mechanised and precision field operations						
10 – 12	4.1 Explain mechanised land preparation techniques. 4.2 Describe precision planting and harvesting operations 4.3 Explain machine performance indicators. 4.4 Describe mechanised crop protection operations 4.5 State factors affecting field operations. 4.6 List advantages and	• Discuss mechanised land preparation techniques (ploughing, harrowing, ridging) • Describe precision planting and harvesting operations • Discuss machine performance indicators (field efficiency, capacity) • Describe mechanised	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Computers	• Perform mechanised land preparation operations • Carry out planting and spraying operations • Measure machine performance and efficiency • Record field operation data • Compare manual vs mechanised operations	Guide students to: • Perform mechanised land preparation operations • Carry out planting and spraying operations • Measure machine performance and efficiency • Record field operation data	Farm machinery, field plots, practical manual.

	limitations of mechanised farming 4.7 Explain environmental impacts of mechanization. 4.8 Describe precision field operations using GPS guidance. 4.9 Explain integration of mechanization in production systems.	crop protection operations • Explain factors affecting field operations (soil, terrain, weather, etc.) • Describe advantages and limitations of mechanised farming • Explain environmental impacts of mechanization • Describe precision field operations using GPS guidance • Discuss integration of mechanization in production systems	Farm implements, Machinery, etc.		• Compare manual vs mechanised operations	
General Objective 5.0: Understand smart farm systems, automation and digital technologies						
13 – 15	5.1 Explain smart farming concepts and digital agriculture systems 5.2 Describe automation in agriculture 5.3 Explain the use of GPS and drones in farm operations 5.4 Describe farm management software and digital platforms 5.5 Explain precision agriculture technologies	• Discuss smart farming concepts and digital agriculture systems • Describe automation in agriculture (robotics, sensors, IoT) • Discuss the use of GPS and drones in farm operations • Describe farm management software and digital platforms	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, Computers	• Use digital tools for farm operation planning • Use GPS-based applications • Simulate smart farming operations • Analyze data for decision-making • Evaluate effectiveness of smart systems	Guide students to: • Use digital tools for farm operation planning • Demonstrate use of GPS-based applications • Simulate smart farming operations • Analyze data for decision-making • Evaluate	Computers, mobile apps, practical manual.

	and applications 5.6 Describe data-driven decision-making in mechanised farming 5.7 State challenges and limitations of smart farming technologies 5.8 Explain future trends in agricultural mechanization 5.9 Explain role of technology in sustainable agriculture	• Discuss precision agriculture technologies and applications • Describe data-driven decision-making in mechanised farming • Discuss challenges and limitations of smart farming technologies • Describe future trends in agricultural mechanization • Discuss role of technology in sustainable agriculture	Apps, etc.		effectiveness of smart systems	
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

BASIC HORTICULTURAL CROP PRODUCTION

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: BASIC HORTICULTURAL CROP PRODUCTION	COURSE CODE: AGT 216	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in the production of common horticultural crops; vegetables, fruits, spices, herbs and ornamentals suitable for smallholder and commercial production in Nigeria.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the scope, classification and importance of horticultural crops; 2.0 Know basic production of leafy and fruit vegetables; 3.0 Understand basic production of common fruits; 4.0 Comprehend basic production of spices, herbs and culinary plants; 5.0 Understand basic ornamental plant production and nursery operations; 6.0 Understand harvesting and basic post-harvest handling of horticultural produce.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: BASIC HORTICULTURAL CROP PRODUCTION			COURSE CODE: AGT 216		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOURS/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 2 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in the production of common horticultural crops; vegetables, fruits, spices, herbs and ornamentals suitable for smallholder and commercial production in Nigeria.						
GENERAL OBJECTIVE 1.0: Understand the scope, classification and importance of horticultural crops						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1- 3	1.1 Define horticulture. 1.2 Explain the scope of horticulture. 1.3 Explain the classification of horticultural crops. 1.4 Describe the nutritional, economic and environmental importance of horticulture. 1.5 Explain common horticultural crops grown in Nigeria.	• Discuss horticulture and its scope (olericulture, pomology, floriculture, landscape, post-harvest, etc) • Discuss the classification of horticultural crops by use, growth habit and climate • Describe the nutritional, economic and environmental importance of horticulture • Discuss common horticultural crops grown in Nigeria	Journals Diagrams/Charts s Marker Board Marker Pictures Videos Computers Horticulture Textbooks, Nihort Publications, Classification Fresh Crop Specimens, Fmard Horticulture Brochures	• Identify horticultural crops on campus/school farms or local market by botanical and common names; tabulate by category and use • Visit a vegetable/fruit market or horticultural farm • Document the range of horticultural crops sold and their seasons • Write a technical report.	Guide students to: • Identify horticultural crops on campus/school farms or local market by botanical and common names; tabulate by category and use • Visit a vegetable/fruit market or horticultural farm • Document the range of horticultural crops sold and their	Campus garden, local market or nearby farms identification charts, notebooks, smartphone for photographs, practical manual.

			Lcd Projector, etc.		seasons • Write a technical report.	
General Objective 2.0: Know basic production of leafy and fruit vegetables						
4 – 6	2.1 Explain production of leafy vegetables. 2.2 Explain production of fruit vegetables 2.3 Explain land preparation, nursery raising, transplanting, spacing, fertilization etc. 2.4 Explain common pests and diseases of vegetables.	• Discuss production of leafy vegetables: amaranth (Amaranthus), fluted pumpkin (Telfairia), African eggplant waterleaf, jute mallow (Corchorus), etc. • Discuss production of fruit vegetables: tomato, pepper, okra, eggplant, watermelon, etc. • Explain land preparation, nursery raising, transplanting, spacing, fertilization etc. • Discuss common pests and diseases of vegetables; basic management	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts , Marker board, Marker, Pictures, Videos Computers Vegetable Plots on School Farm, NIHORT Vegetable Variety Brochures NPK Fertilizer Hoes Watering Cans Knapsack Sprayer PPE LCD Projector, etc.	• Establish a plot of leafy and fruit vegetables each; preparation, nursery raising, transplanting, fertilization etc. • Identify vegetable pests/diseases on the plots using mobile app or visual • Observe recommend basic management • Carry out harvesting • Determine yield • Report activities	Guide students to: • Establish a plot of leafy and fruit vegetables each; preparation, nursery raising, transplanting, fertilization etc. • Identify vegetable pests/diseases on the plots using mobile app or visual • Observe recommend basic management • Carry out harvesting • Determine yield • Report activities	School farm, vegetable seeds, organic and inorganic fertilizer's hoes, weighing scale; smartphones with relevant apps scouting record sheet, practical manual.
General Objective 3.0: Understand basic production of common fruits						

7 – 9	3.1 Describe production of pawpaw, banana/plantain, pineapple etc. 3.2 Describe production of citrus, mango, guava, soursop, cashew etc. 3.3 Explain propagation: seed sowing, sucker separation, simple grafting/budding 3.4 Explain orchard management: weeding, fertilizing, mulching, watering, etc.	• Discuss pawpaw seedling raising and field planting, banana sucker propagation; pineapple slip propagation. • Describe citrus rootstock-scion grafting and budding mango grafting; guava and cashew from seed for trees • Describe seed sowing in poly bags; sucker separation; simple T-budding on citrus • Discuss weeding (manual hoeing, mulching), fertilizer ring application, watering schedule for young trees	Textbooks Journals Diagrams/Charts Marker Board Marker Pictures Videos Computers Pawpaw Seeds, Banana Suckers, Pineapple Slips, Citrus Rootstocks, Scion Sticks, Grafting Tools, NIHORT/NRC RI Brochures, LCD Projector, etc.	• Raise pawpaw seedlings in poly-bag nursery; transplant • Carry out simple T-budding on citrus rootstocks; record success rate • Establish mini-orchard with pawpaw, banana, citrus and mango at recommended spacing	Guide students to: • Raise pawpaw seedlings in poly-bag nursery; transplant • Carry out simple T-budding on citrus rootstocks; record success rate • Establish mini-orchard with pawpaw, banana, citrus and mango at recommended spacing	Pawpaw Cashew, guava seeds etc Poly bags, soil, watering can; citrus rootstocks, scion sticks, grafting knife, parafilm; school farm, mini-orchard plot, planting tools, practical manual.
General Objective 4.0: Understand basic production of spices, herbs and culinary plants						
10 – 12	4.1 Explain common spices and herbs. 4.2 Describe ecology and basic agronomy of common spices and herbs. 4.3 Explain planting and management of selected spices and herbs	• Explain common spices and herbs: ginger, garlic turmeric, Scent leaf, bitter leaf lemon grass • Describe ecology and basic agronomy of each • Explain planting and management of selected spices and herbs • Describe medicinal and	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker,	• Establish spice/herb garden with ginger, scent leaf, lemon grass and bitter leaf; plant at recommended spacing • Harvest mature scent leaf or lemon grass at maturity; sun-dry; package; document yield	Guide students to: • Establish spice/herb garden with ginger, scent leaf, lemon grass and bitter leaf; plant at recommended spacing • Harvest mature	Onion Ginger rhizomes, scent leaf cuttings, lemon grass slips, school farm, watering can; harvesting

	4.4 Describe medicinal and economic uses; market value	economic uses; market value	Pictures, Videos Spice And Herb Specimens (Fresh And Dried), Planting Materials, NRCRI/NIHORT Publications, LCD Projector, etc.		scent leaf or lemon grass at maturity; sun-dry; package; document yield	tools, drying mat, packaging materials, practical manual.
General Objective 5.0: Understand basic ornamental plant production and nursery operations						
13 – 14	5.1 Explain common ornamentals 5.2 Explain asexual propagation 5.3 Explain nursery operations 5.4 Describe lawn establishment using sods/sprigs; basic lawn maintenance	• Discuss common ornamentals: Bougainvillea, Hibiscus, Ixora, Allamanda, Crotons, Heliconia, lawn grasses etc • Discuss asexual propagation: stem cutting, leaf cutting, simple layering • Discuss nursery operations: media preparation, sowing, watering, hardening, transplanting • Describe lawn establishment using sods/sprigs; basic lawn maintenance	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Ornamental cuttings, IBA powder, nursery trays, growing media, watering cans, lawn grass sods, LCD projector, etc.	• Carry out stem cuttings of Hibiscus, Bougainvillea and Ixora using IBA dip • Record root initiation and survival after 4 weeks • Establish a lawn using sodding or sprigging; water and maintain for weeks • Record establishment	Guide students to: • Carry out stem cuttings of Hibiscus, Bougainvillea and Ixora using IBA dip; record root initiation and survival after 4 weeks • Establish a lawn using sodding or sprigging; water and maintain for weeks; record establishment	Plant materials, IBA, secateurs, propagation media, polythene bags; lawn grass sods/sprigs, school lawn area, water, weeding tools, practical manual.

General Objective: 6.0: Understand harvesting and post-harvest handling						
15	6.1 Describe harvest maturity for vegetables, fruits and spices 6.2 Explain harvesting using appropriate tools and techniques 6.3 Explain sorting, grading, washing/cleaning, packaging, etc. 6.4 Describe storage: ambient, ventilated, evaporative cooling, hermetic bags	• Explain maturity indicators: tomato colour break, okra tenderness, pawpaw colour change, ginger leaf yellowing, etc. • Discuss manual harvesting; pruning shears; minimal mechanical damage • Discuss sorting by size/colour/defects; grading into Class I/II/III; washing; packaging in cartons or crates • Compare ambient (open basket) vs ventilated (slatted crate) vs evaporative cooler; show hermetic bag use	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Mature Crops, Harvesting Tools, Sorting Trays, Packaging Materials, Evaporative Cooler (Where Available), Hermetic Bags, LCD Projector	• Harvest tomato, okra, scent leaf, • Sort, grade, wash and pack • Compare 3 storage methods (ambient, ventilated crate, evaporative cooler) for days • Assess weight loss and quality	Guide students to: • Harvest tomato, okra, scent leaf, etc; sort, grade, wash and pack • Compare 3 storage methods (ambient, ventilated crate, evaporative cooler) for days; assess weight loss and quality	Vegetable plots, harvesting tools, sorting trays, cartons; Horticultural crops, baskets, ventilated crates, evaporative cooler, practical manual.
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						



INTEGRATED FARM PRACTICE

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: INTEGRATED FARM PRACTICE II	COURSE CODE: AGT 221	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 0
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with skill of integrated farm enterprise and cooperative development in preparation for self-employment and commercial agricultural practice.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Apply integrated crop production practices; 2.0 Apply commercial livestock production and management operations; 3.0 Manage aquaculture enterprise operations at production level; 4.0 Manage farm machinery and mechanised systems; 5.0 Maintain farm records, conduct financial analysis and observe safety standards; 6.0 Apply cooperative model development and contract farming practices.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: INTEGRATED FARM PRACTICE II			COURSE CODE: AGT 221		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 2		THEORETICAL: 0	
YEAR: II SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with skill of integrated farm enterprise and cooperative development in preparation for self-employment and commercial agricultural practice.						
GENERAL OBJECTIVE 1.0: Apply integrated crop production practices.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3				• Apply precision land preparation techniques using appropriate mechanised equipment • Carry out crop establishment using improved and climate-resilient varieties • Apply fertilizers and organic amendments at site-specific recommended rates • Carry out integrated pest and disease management using approved methods • Apply precision irrigation scheduling based on crop water requirements • Harvest crops at correct	Guide students to: • Apply precision land preparation techniques using appropriate mechanised equipment • Carry out crop establishment using improved and climate-resilient varieties • Apply fertilizers and organic amendments at site-specific recommended rates • Carry out integrated pest and disease	Farm plots, tractors, power tiller, implements Improved variety seeds, planting materials Fertilizers, organic amendments, measuring tools Sprayers, biopesticides, PPE Irrigation kits, drip lines

				maturity stage and apply post-harvest handling procedures • Assess crop enterprise performance and record yield data for decision-making	management using approved methods • Apply precision irrigation scheduling based on crop water requirements • Harvest crops at correct maturity stage and apply post-harvest handling procedures • Assess crop enterprise performance and record yield data for decision-making	Harvest tools, grading equipment, weighing scale Yield record sheets, farm logbooks, mobile apps, Practical manual.
General Objective 2.0: Apply commercial livestock production and management operations.						
				• Prepare livestock housing for commercial production standards • Manage livestock housing for commercial production standards • Formulate balanced feed rations for selected livestock species • Apply balanced feed rations for selected livestock species • Carry out complete routine management operations for	Guide students to: • Prepare livestock housing for commercial production standards • Manage livestock housing for commercial production standards • Formulate balanced feed rations for selected livestock species	Livestock units (poultry, ruminant, pig) Feed materials, mixing equipment, weighing scale Feeders, drinkers, cleaning

				poultry, ruminants and pigs • Apply biosecurity measures and disease prevention protocols on the livestock unit • Carry out vaccination, deworming and basic treatment procedures under supervision • Assess livestock enterprise performance using production records and targets • Maintain comprehensive livestock enterprise records • Analyse performance data	• Apply balanced feed rations for selected livestock species • Carry out complete routine management operations for poultry, ruminants and pigs • Apply biosecurity measures and disease prevention protocols on the livestock unit • Carry out vaccination, deworming and basic treatment procedures under supervision • Assess livestock enterprise performance using production records and targets • Maintain comprehensive livestock enterprise records • Analyse performance data	tools, disinfectants Vaccines, syringes, drugs, PPE Biosecurity equipment, footbaths Livestock enterprise record templates, performance target charts Farm logbooks, calculators Practical manual, etc.
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General Objective 3.0: Manage aquaculture enterprise operations at production level.

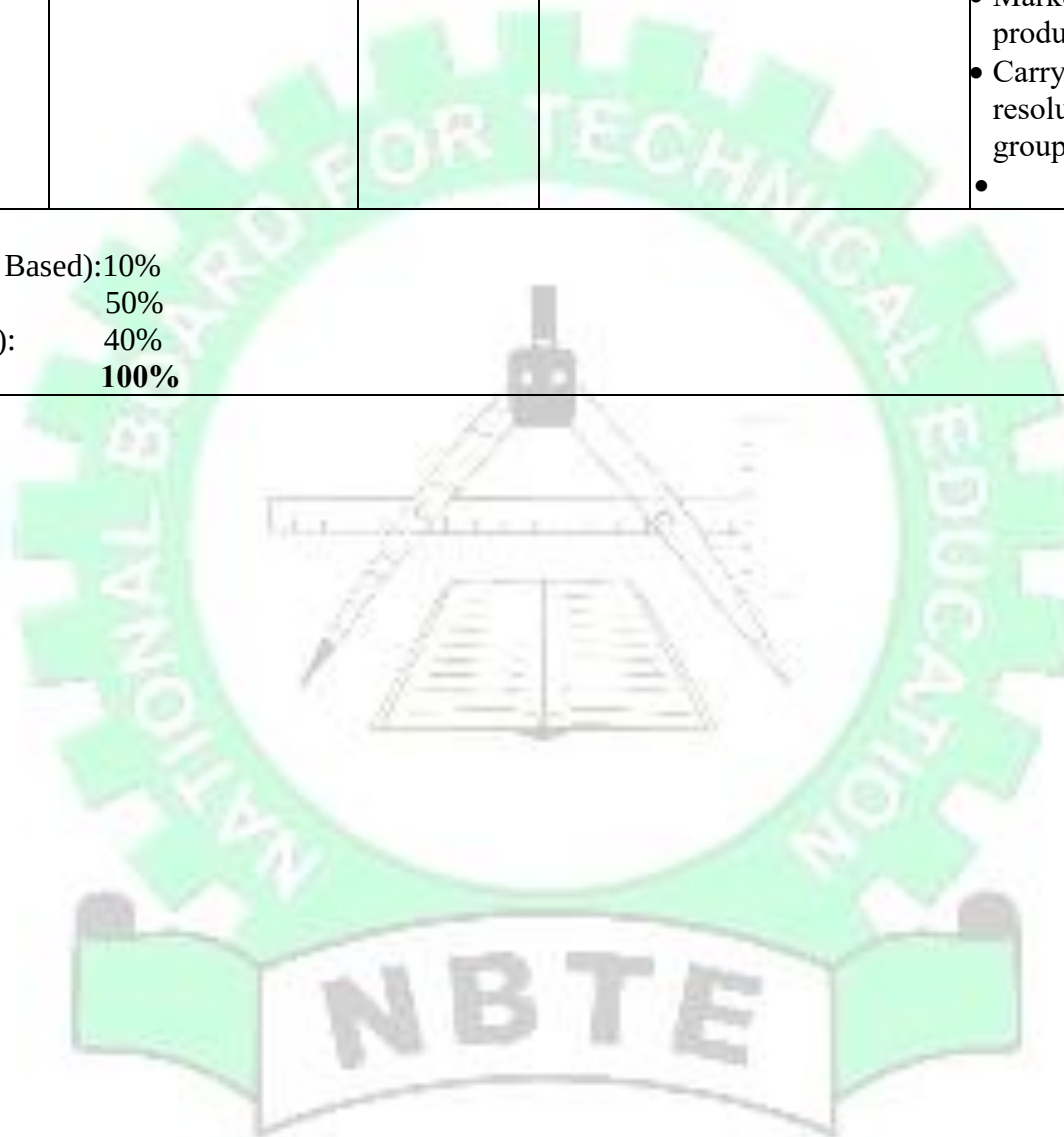
7 – 8				• Carry out complete pond and tank preparation for commercial fish production • Apply fish breeding and stocking operations at recommended densities • Carry out the Formulation and application of fish feed rations based on feeding schedules and FCR targets • Monitor water quality parameters to maintain optimum fish health • Apply disease prevention and biosecurity measures in the fish production unit • Carry out fish harvesting, processing and value addition operations • Maintain comprehensive aquaculture enterprise records • Analyse production data	Guide students to: • Carry out complete pond and tank preparation for commercial fish production • Apply fish breeding and stocking operations at recommended densities • Carry out the Formulation and application of fish feed rations based on feeding schedules and FCR targets • Monitor water quality parameters to maintain optimum fish health • Apply disease prevention and biosecurity measures in the fish production unit • Carry out fish harvesting, processing and value	Fish ponds, tanks, nets, aeration equipment Fish fingerlings, feed materials Water quality testing kits (pH, DO, temperature) Weighing scale, FCR calculation sheets Disease treatment and biosecurity kits Harvesting nets, processing tools, smoking kiln Aquaculture enterprise record templates, logbooks, Practical
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					addition operations • Maintain comprehensive aquaculture enterprise records • Analyse production data	manual.
General Objective 4.0: Manage farm machinery and mechanised systems.						
9 – 10				• Operate tractors, power tillers and key farm implements safely and efficiently • Carry out mechanised land preparation, planting and harvesting operations • Calibrate sprayers, planters and other field equipment for accurate application • Carry out preventive maintenance and servicing of farm machinery and equipment • Diagnose common machine faults using correct procedures • Report common machine faults • Demonstrate proper safe operation and storage of all farm power equipment • Record machine operation hours, fuel consumption and	Guide students to: • Operate tractors, power tillers and key farm implements safely and efficiently • Carry out mechanised land preparation, planting and harvesting operations • Calibrate sprayers, planters and other field equipment for accurate application • Carry out preventive maintenance and servicing of farm machinery and equipment • Diagnose common machine faults using correct procedures	Tractors, power tillers, disc plough, harrow, ridger Planters, sprayers, harvesting equipment Calibration containers, measuring cylinders Lubricants, spanners, toolboxes, service manual PPE Machine operation and maintenance record sheets

				maintenance activities • Report common machine faults • Demonstrate proper safe operation and storage of all farm power equipment • Record machine operation hours, fuel consumption and maintenance activities	Fuel logbooks, Practical manual.
General Objective 5.0: Maintain farm records, conduct financial analysis and observe safety standards.					
11-12				• Maintain comprehensive farm enterprise records covering all production activities • Prepare a simple farm enterprise budget and calculate gross margin for one enterprise • Analyse farm income and expenditure records to assess enterprise profitability • Use digital tools and mobile apps to record and manage farm data • Apply all required safety practices, PPE use and first aid across all farm enterprises • Identify farm hazards • Implement corrective safety	Guide students to: • Maintain comprehensive farm enterprise records covering all production activities • Prepare a simple farm enterprise budget and calculate gross margin for one enterprise • Analyse farm income and expenditure records to assess enterprise profitability • Use digital tools and mobile apps to record and manage Enterprise record templates (crop, livestock, fish) Enterprise budget worksheets, calculators Farm income and expenditure record books Smartphones, tablets, farm management apps Spreadsheet

				measures.	farm data • Apply all required safety practices, PPE use and first aid across all farm enterprises • Identify farm hazards • Implement corrective safety measures.	software (computers) PPE (full sets), first aid kits Safety signs, hazard identification charts, Practical manual.
General Objective 6.0: Apply cooperative model development and contract farming practices.						
13-15				• Carryout contract farming models • Carry out Formation and registration of student's cooperative. • Allocate student into group • Raise funds by the group members • Coordinate the group by selected group members (3-5) • Coordinate finances of the group • Render account of all the operations to the group members • Market farm products • Carry out conflict resolutions by the group members	Guide students to: • Carryout contract farming models • Carry out Formation and registration of student's cooperative. • Allocate student into group • Raise funds by the group members • Coordinate the group by selected group members (3-5) • Coordinate finances of the group • Render account of all the operations to the group members	Farm land Livestock pens Practical manual.

					• Market farm products • Carry out conflict resolutions by the group members •	
COURSE ASSESSMENT Course Assessment (Practical Based):10% Practical: 50% Examination (Practical Based): 40% Total: 100%						



POSTHARVEST TECHNOLOGY AND FOOD SAFETY SYSTEMS

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: POSTHARVEST TECHNOLOGY AND FOOD SAFETY SYSTEMS	COURSE CODE: AGT 222	CONTACT HOURS: 3 HOUR/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOUR/WEEK
GOAL: This course is designed to equip students with knowledge and skills in postharvest handling, storage, processing, food safety, and value addition for agricultural products to reduce losses and improve quality and profitability.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand postharvest handling and loss reduction techniques; 2.0 Know storage, preservation and processing methods; 3.0 Understand food safety, hygiene and quality control systems; 4.0 Comprehend value addition and agro-processing techniques; 5.0 Understand post-harvest management, packaging and marketing systems.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: POSTHARVEST TECHNOLOGY AND FOOD SAFETY SYSTEMS			COURSE CODE: AGT 222	CONTACT HOURS: 3 HOUR/WEEK		
			CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II			PRE-REQUISITE:	PRACTICAL: 2 HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in postharvest handling, storage, processing, food safety, and value addition for agricultural products to reduce losses and improve quality and profitability						
GENERAL OBJECTIVE 1.0: Understand postharvest handling and loss reduction techniques						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Explain postharvest physiology and causes of losses (mechanical, biological, physiological, etc) 1.2 Describe factors affecting postharvest quality (temperature, humidity, handling, etc). 1.3 Explain harvesting maturity indices for crops. 1.4 Explain handling techniques for different commodities. 1.5 Explain loss assessment and reduction strategies 1.6 Describe role of cold	• Explain postharvest concepts using real crop examples. • Discuss maturity indices and handling techniques. • Discuss causes of losses using case studies. • Describe handling techniques for different commodities. • Discuss loss assessment and reduction strategies. • Discuss role of cold chain systems. • Discuss economic	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Crop samples, charts, etc.	• Harvest crops at correct maturity stage. • Handle produce to minimize damage. • Assess postharvest losses quantitatively and qualitatively. • Carry out sorting and grading of produce. • Apply basic loss reduction techniques. • Record loss data	Guide students to: • Harvest crops at correct maturity stage. • Handle produce to minimize damage. • Assess postharvest losses quantitatively and qualitatively. • Carry out sorting and grading of produce • Apply basic loss reduction techniques.	Crops, Grading tools Videos Charts Digital apps, practical manual, etc.

	chain systems. 1.7 Explain importance of proper handling in food systems. 1.8 Describe economic impact of postharvest losses. 1.9 Explain sustainability in postharvest systems.	impact of postharvest losses. • Explain sustainability in postharvest systems				
General Objective 2.0: Know storage, preservation and processing methods						
4 - 6	2.1 Explain storage principles and systems. 2.2 Explain preservation methods. 2.3 Explain processing techniques for crops and livestock products. 2.4 Describe storage pests and control methods 2.5 Explain shelf-life extension techniques 2.6 Describe packaging technologies 2.7 Explain role of temperature and moisture control 2.8 Describe storage facility design and management 2.9 Explain environmental and economic considerations	• Discuss storage principles and systems (ambient, refrigerated, controlled atmosphere, etc). • Discuss preservation methods (drying, freezing, smoking, fermentation, etc). • Discuss processing techniques for crops and livestock products • Describe storage pests and control methods • Discuss shelf-life extension techniques • Describe packaging technologies • Discuss role of temperature and moisture control • Explain storage	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Storage units, processing tools, etc.	• Store produce under different conditions • Apply preservation methods (drying, smoking, freezing, etc) • Process selected agricultural products • Detect pests and diseases using appropriate tools • Control storage pests • Package products appropriately • Monitor storage conditions and record the outcomes	Guide students to: • Store produce under different conditions • Apply preservation methods (drying, smoking, freezing, etc) • Process selected agricultural products • Detect pests and diseases using appropriate tools • Control storage pests • Package products appropriately • Monitor storage conditions and	Crops Processing tools, storage facilities, practical manual.

		facility design and management • Discuss environmental and economic considerations			record the outcomes	
General Objective 3.0: Understand food safety, hygiene and quality control systems						
7 – 9	3.1 Explain principles of food safety and hygiene 3.2 Describe food contamination 3.3 Explain Hazard Analysis and Critical Control Points (HACCP) 3.4 Describe quality control standards and regulations 3.5 Explain sanitation and hygiene practices in processing 3.6 Describe food safety management systems 3.7 Explain traceability and quality assurance 3.8 Describe foodborne diseases and prevention 3.9 Explain regulatory requirements in food systems	• Discuss principles of food safety and hygiene • Describe food contamination (physical, chemical, biological, etc.) • Discuss Hazard Analysis and Critical Control Points (HACCP) • Describe quality control standards and regulations • Discuss sanitation and hygiene practices in processing • Describe food safety management systems • Discuss traceability and quality assurance • Describe foodborne diseases and prevention	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, PPE, manuals, etc.	• Apply hygiene and sanitation practices • Identify contamination source • Implement basic HACCP procedures • Monitor quality control parameters • Maintain safety records • Inspect processing environment	Guide students to: • Apply hygiene and sanitation practices • Identify contamination source • Implement basic HACCP procedures • Monitor quality control parameters • Maintain safety records • Inspect processing environment	PPE, sanitation tools, practical manual.

		• Discuss regulatory requirements in food systems				
General Objective 4.0: Comprehend value addition and agro-processing techniques						
10 – 12	4.1 Explain value addition concepts in agriculture 4.2 Describe processing techniques for various commodities 4.3 Explain product development and diversification 4.4 Describe small-scale agro-processing systems 4.5 Explain packaging and branding techniques 4.6 Describe quality standards for processed products 4.7 Explain economic benefits of value addition 4.8 Describe market requirements for processed products 4.9 Explain entrepreneurship in agro-processing	• Discuss value addition concepts in agriculture • Describe processing techniques for various commodities • Discuss product development and diversification • Describe small-scale agro-processing systems • Discuss packaging and branding techniques • Describe quality standards for processed products • Discuss economic benefits of value addition • Describe market requirements for processed products • Discuss entrepreneurship in agro-processing	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Computers Processing tools, packaging materials, etc.	• Process raw products into value-added products • Package products • Develop new product ideas • Evaluate product quality and acceptability • Analyze cost and profitability • Present value-added products	Guide students to: • Process raw products into value-added products • Package products • Develop new product ideas • Evaluate product quality and acceptability • Analyze cost and profitability • Present value-added products	Crops Processing equipment, practical manual.

General Objective 5.0: Understand postharvest management, packaging and marketing systems						
13 – 15	5.1 Explain postharvest management systems and supply chains 5.2 Describe packaging systems and materials 5.3 Explain transportation and logistics in postharvest systems 5.4 Describe market requirements and standards 5.5 Explain pricing and marketing strategies 5.6 Describe cold chain management 5.7 Explain quality assurance in marketing 5.8 Describe export standards and requirements 5.9 Explain strategies for reducing postharvest losses in markets	• Discuss postharvest management systems and supply chains • Describe packaging systems and materials • Discuss transportation and logistics in postharvest systems • Describe market requirements and standards • Discuss pricing and marketing strategies • Describe cold chain management • Discuss quality assurance in marketing • Describe export standards and requirements • Discuss strategies for reducing postharvest losses in markets	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, Packaging materials, etc.	• Package produce for market • Transport products using proper methods • Analyze market demand and pricing • Develop marketing strategies • Evaluate packaging effectiveness • Record marketing data • Analyze marketing data	Guide students to: • Package produce for market • Transport products using proper methods • Analyze market demand and pricing • Develop marketing strategies • Evaluate packaging effectiveness • Record marketing data • Analyze marketing data	Crops Packaging tools, market data, practical manual.
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

CLIMATE-SMART AGRICULTURE AND SUSTAINABILITY SYSTEMS

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: CLIMATE-SMART AGRICULTURE AND SUSTAINABILITY SYSTEMS	COURSE CODE: AGT 223	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in climate-smart agriculture, environmental sustainability, resource conservation, and resilient agricultural systems for sustainable food production.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand climate change concepts and impacts on agriculture; 2.0 Know climate-smart agricultural practices and technologies; 3.0 Understand natural resource conservation and sustainable land management; 4.0 Understand adaptation, mitigation and resilience strategies in agriculture; 5.0 Comprehend sustainability assessment and climate-informed decision-making.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: CLIMATE-SMART AGRICULTURE AND SUSTAINABILITY SYSTEMS			COURSE CODE: AGT 223	CONTACT HOURS: 3 HOURS/WEEK		
			CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II			PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and practical skills in climate-smart agriculture, environmental sustainability, resource conservation, and resilient agricultural systems for sustainable food production.						
GENERAL OBJECTIVE 1.0: Understand climate change concepts and impacts on agriculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Explain climate change concepts and drivers 1.2 Describe climate variability and weather patterns 1.3 Explain impacts of climate change on crop, livestock and fisheries 1.4 Describe effects on soil, water and biodiversity 1.5 Explain vulnerability and risk in agricultural systems 1.6 Describe climate trends and projections (basic concept) 1.7 Explain role of agriculture in climate change	• Discuss climate change concepts and drivers (GHGs, global warming) • Describe climate variability and weather patterns • Discuss impacts of climate change on crop, livestock and fisheries • Describe effects on soil, water and biodiversity • Discuss vulnerability and risk in agricultural systems • Discuss climate trends	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Pictures, Videos, Crop samples, charts, climate data, etc.	• Analyze local climate data (rainfall, temperature trends etc.) • Create content on Greenhouse effect using local examples • Identify climate-related risks on farms • Assess vulnerability of selected enterprises • Present findings on climate impacts • Map climate risks in local context	Guide students to: • Analyze local climate data (rainfall, temperature trends etc.) • Illustrate Greenhouse effect using local examples • Identify climate-related risks on farms • Assess vulnerability of selected enterprises • Present findings on climate	Climate datasets, weather station (Manual and Automatic Weather Station), practical manual.

	1.8 Describe socio-economic impacts on farmers 1.9 Explain need for climate adaptation	and projections (basic concept) • Discuss role of agriculture in climate change • Describe socio-economic impacts on farmers • Discuss need for climate adaptation			impacts • Map climate risks in local context	
General Objective 2.0: Know climate-smart agricultural practices and technologies						
4 - 6	2.1 Explain climate-smart agriculture (CSA) principles 2.2 Outline CSA practices 2.3 Explain drought-tolerant and resilient crop varieties 2.4 Describe water management techniques 2.5 Explain soil moisture conservation practices 2.6 Describe integration of crops, livestock and trees 2.7 Explain role of technology in CSA and Climate Smart dimensions 2.8 Describe benefits and limitations of CSA practices	• Discuss climate-smart agriculture (CSA) principles • Describe CSA practices (conservation agriculture, agroforestry, irrigation efficiency etc.) • Describe drought-tolerant and resilient crop varieties • Discuss water management techniques (rainwater harvesting, drip irrigation etc.) • Discuss soil moisture conservation practices • Describe integration	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Crop samples, charts Field plots, tools, climate smart tools, meteorological data, etc.	• Implement conservation agriculture practices • Apply mulching and water conservation techniques • Establish simple agroforestry systems • Demonstrate efficient irrigation methods Illustrate Climate Smart dimensions • Evaluate effectiveness of CSA practices • Record results and observations	Guide students to: • Implement conservation agriculture practices • Apply mulching and water conservation techniques • Establish simple agroforestry systems • Demonstrate efficient irrigation methods Illustrate Climate Smart dimensions • Evaluate	Farm tools, irrigation kits, climate smart apps, meteorological data, practical manual.

	2.9 Explain scaling CSA practices	of crops, livestock and trees • Discuss role of technology in CSA and Climate Smart dimensions • Describe benefits and limitations of CSA practices • Discuss scaling CSA practices			effectiveness of CSA practices • Record results and observations	
General Objective 3.0: Understand natural resource conservation and sustainable land management						
7 – 9	3.1 Explain principles of natural resource management 3.2 Explain soil conservation techniques 3.3 Explain water conservation and watershed management 3.4 Describe biodiversity conservation in agriculture 3.5 Explain sustainable land use planning 3.6 Describe ecosystem services in agriculture 3.7 Explain environmental degradation and control 3.8 Describe sustainable intensification 3.9 Explain role of	• Discuss principles of natural resource management • Describe soil conservation techniques (terracing, contouring) • Discuss water conservation and watershed management • Describe biodiversity conservation in agriculture • Discuss sustainable land use planning and ecosystem services in agriculture • Explain	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Crop samples, charts Field tools, etc.	• Implement soil conservation structures • Apply water conservation techniques • Assess land degradation and propose solutions • Develop sustainable land use plans • Monitor conservation practices • Record environmental indicators	Guide students to: • Implement soil conservation structures • Apply water conservation techniques • Assess land degradation and propose solutions • Develop sustainable land use plans • Monitor conservation practices • Record environmental	Field tools, meteorological station, practical manual.

	policies in resource management	environmental degradation and control • Discuss sustainable intensification and role of policies in resource management			indicators	
General Objective 4.0: Understand adaptation, mitigation and resilience strategies in agriculture						
9 – 12	4.1 Explain adaptation strategies in agriculture 4.2 Describe mitigation strategies 4.3 Explain resilience building in farming systems 4.4 Outline climate risk management strategies 4.5 Explain early warning systems and climate information services 4.6 Describe diversification strategies 4.7 Explain role of insurance and risk-sharing mechanisms 4.8 Describe community-based adaptation 4.9 Explain policy support for resilience	• Discuss adaptation strategies in agriculture • Describe mitigation strategies (carbon reduction, sustainable practices etc.) • Discuss resilience building in farming systems • Describe climate risk management strategies • Discuss early warning systems and climate information services • Describe diversification strategies • Explain role of insurance and risk-sharing mechanisms • Discuss community-based adaptation and	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos Crop samples, charts Case studies	• Develop climate adaptation plans for farms • Identify mitigation strategies for enterprises • Analyze local risks prevalent and propose solutions • Use climate information for planning • Evaluate resilience strategies of local community • Present adaptation plans	Guide students to: • Develop climate adaptation plans for farms • Identify mitigation strategies for enterprises • Analyze local risks prevalent and propose solutions • Use climate information for planning • Evaluate resilience strategies of local community • Present adaptation plans	Field tools, meteorological station, Templates practical manual.

		policy support for resilience				
General Objective 5.0: Comprehend sustainability assessment and climate-informed decision-making						
13 – 15	5.1 Explain sustainability indicators in agriculture 5.2 Describe environmental, economic and social sustainability 5.3 Explain sustainability assessment tools 5.4 Describe climate-informed decision-making processes 5.5 Explain data-driven sustainability planning 5.6 Describe monitoring and evaluation of sustainability 5.7 Explain reporting and documentation 5.8 Describe challenges in sustainability implementation 5.9 Explain continuous improvement strategies	• Discuss sustainability indicators in agriculture • Explain environmental, economic and social sustainability • Discuss sustainability assessment tools • Describe climate-informed decision-making processes • Discuss data-driven sustainability planning • Describe monitoring and evaluation of sustainability • Discuss reporting and documentation • Describe challenges in sustainability implementation • Discuss continuous improvement strategies	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos, Crop samples, charts, Templates, data, etc.	• Assess sustainability of farm systems within the community • Develop sustainability improvement plans for the community • Analyze environmental and economic data • Prepare sustainability reports • Present climate-informed decisions • Evaluate outcomes	Guide students to: • Assess sustainability of farm systems within the community • Develop sustainability improvement plans for the community • Analyze environmental and economic data • Prepare sustainability reports • Present climate-informed decisions • Evaluate outcomes	Field tools, meteorological station Templates, datasets, practical manual.

COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	100%



PRINCIPLES OF GENETICS, BREEDING AND BIOTECHNOLOGY IN AGRICULTURE

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF GENETICS, BREEDING AND BIOTECHNOLOGY IN AGRICULTURE	COURSE CODE: AGT 224	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of the basic principles of heredity, crops and livestock improvement and the role of biotechnology in modern agricultural practices.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand basic concepts of genetics and cell division; 2.0 Know Mendelian laws of inheritance and their applications; 3.0 Understand the structure and function of genes and chromosomes; 4.0 Understand simple gene interactions and hybrid vigour; 5.0 Appreciate the principles of animal and plant reproduction; 6.0 Understand the role of selection in agricultural improvement; 7.0 Know common breeding methods for livestock and crops; 8.0 Comprehend the basic concepts and applications of biotechnology in agriculture.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: PRINCIPLES OF GENETICS, BREEDING AND BIOTECHNOLOGY IN AGRICULTURE			COURSE CODE: AGT 224		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of the basic principles of heredity, crops and livestock improvement and the role of biotechnology in modern agricultural practices.						
GENERAL OBJECTIVE 1.0: Understand basic concepts of genetics and cell division						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define genetics and breeding. 1.2 Explain the importance of genetics in agriculture. 1.3 Explain the concepts of Mitosis and Meiosis.	• Explain genetics and breeding. • Discuss the importance of genetics in agriculture. • Discuss the concepts of Mitosis and Meiosis.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Microscopes, slides, charts of cell cycles, etc.	• Prepare slides of plants or animal cells undergoing mitosis and meiosis. • Draw the different stages of mitosis and meiosis. • Construct simple 3D models of DNA and chromosomes.	Guide students to: • Prepare slides of plants or animal cells undergoing mitosis and meiosis. • Draw the different stages of mitosis and meiosis. • Construct simple 3D models of DNA and chromosomes.	Microscopes, prepared slides, charts of cell cycles, drawing materials, Videos Computer, 3D software, practical manual.
GENERAL OBJECTIVE 2.0: Know Mendelian laws of inheritance and their applications.						
3 - 4	2.1 Explain Mendel’s	• Discuss Mendel’s	Textbooks, Journals,	• Solve various genetic	Guide students to:	Whiteboard,

	First Law (Segregation). 2.2 Explain Mendel's Second Law (Independent Assortment). 2.3 Explain the use of Punnett squares for simple crosses.	First Law (Segregation). • Discuss Mendel's Second Law (Independent Assortment). • Explain the use of Punnett squares for simple crosses.	Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Crop samples, charts, worksheets. Software, etc.	problems involving monohybrid and dihybrid crosses using Punnett squares.	• Solve various genetic problems involving monohybrid and dihybrid crosses using Punnett squares.	markers, worksheets. worksheets. Projector Software, practical manual.
GENERAL OBJECTIVE 3.0: Understand the structure and function of genes and chromosomes.						
5 - 6	3.1 Define genes, alleles, and chromosomes. 3.2 Explain Dominance and Recessive genes. 3.3 Explain Incomplete Dominance and Co-dominance.	• Explain genes, alleles, and chromosomes. • Explain Dominance and Recessive genes. • Explain Incomplete Dominance and Co-dominance.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Live animals or photographs, charts, etc.	• Identify dominant and recessive traits in local farm animals or crop varieties.	Guide students to: • Identify dominant and recessive traits in local farm animals or crop varieties.	Live animals or photographs, charts, practical manual.
GENERAL OBJECTIVE 4.0: Understand simple gene interactions and hybrid vigour.						
7 - 8	4.1 Define Epistasis in simple terms. 4.2 Explain the concept of	• Explain Epistasis. • Discuss the concept of Hybrid Vigour	Textbooks, Journals, Internet, Projector,	• Compare growth data of hybrids vs. local breeds.	Guide students to: • Compare growth data of hybrids	Production records, growth charts, practical manual.

	Hybrid Vigour (Heterosis). 4.3 Explain why hybrids often perform better than parents.	(Heterosis). • Discuss why hybrids often perform better than parents.	Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Production records, growth charts, etc.		vs. local breeds.	
GENERAL OBJECTIVE 5.0: Appreciate the principles of animal and plant reproduction.						
9 - 10	5.1 Explain the reproductive organs in farm animals. 5.2 Explain the reproductive hormones in plants and animals 5.3 Explain causes of reproductive failure in plants and animals	• Discuss the reproductive organs in farm animals. • Discuss the reproductive hormones in plants and animals • Discuss causes of reproductive failure in plants and animals	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Anatomical models, preserved specimens, etc.	• Identify reproductive organs using models or specimens.	Guide students to • Identify reproductive organs using models or specimens.	Anatomical models, preserved specimens, charts of reproductive cycles, microscope, practical manual.
GENERAL OBJECTIVE 6.0: Understand the role of selection in agricultural improvement.						
11 - 12	6.1 Define Natural vs. Artificial	• Discuss "Survival of the	Textbooks, Journals,	• Carry out culling and selection of animals	Guide students to: • Carry out culling	Farm records, weighing scales,

	Selection. 6.2 Identify traits for selection (growth rate, yield, disease resistance etc). 6.3 Explain how to choose the best parents.	fittest” vs. “Breeder’s choice”. • Explain traits for selection (growth rate, yield, disease resistance etc). • Explain how to choose the best parents.	Internet, Articles, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Farm records, weighing scales, etc.	based on records. • Carry out rogueing and selection in crops	and selection of animals based on records. • Carry out rogueing and selection in crops	practical manual.
GENERAL OBJECTIVE 7.0: Know common breeding methods for livestock and crops.						
13	7.1 Explain Inbreeding and its risks. 7.2 Explain Crossbreeding and its benefits. 7.3 Explain Linebreeding and Outbreeding. 7.4 Explain the Artificial Insemination Method in Livestock	• Discuss Inbreeding and its risks. • Describe Crossbreeding and its benefits. • Discuss Linebreeding and Outbreeding. • Discuss the Artificial Insemination Method in Livestock • Simplify the pros and cons of each method for a farmer.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Transportation, field guides, etc.	• Observe different breeding programs in practice (e.g., crossbreeding for beef, linebreeding for dairy). • Report observation	• Organize a visit to breeding station or commercial farm to observe different breeding programs in practice (e.g., crossbreeding for beef, linebreeding for dairy).	Transportation, field guides, breeding program templates, practical manual.

GENERAL OBJECTIVE 8.0: Comprehend the basic concepts and applications of biotechnology in agriculture.						
14-15	8.1 Define agricultural biotechnology. 8.2 Explain the benefits of agricultural biotechnology 8.3 Outline basic techniques in agricultural biotechnology 8.4 Explain the applications of biotechnology in crops and livestock improvement. 8.5 Explain the challenges of agricultural biotechnology	• Explain agricultural biotechnology and its benefits • Discuss basic techniques (e.g., tissue culture, genetic modification) in agricultural biotechnology • Discuss the applications of biotechnology in crops and livestock improvement. • Discuss the challenges of agricultural Biotechnology	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Lab equipment, case studies	• Observe plant tissue culture setup • Analyse case studies of GMOs • Write a report on a study visit to a tissue culture laboratory. • Participate in a simple plant tissue culture setup (e.g., propagating a plant from a small explant).	Guide students to: • Observe plant tissue culture setup • Identify case studies of GMOs. • Organize a visit to a tissue culture lab. • Participate in a simple plant tissue culture setup (e.g., propagating a plant from a small explant).	Lab equipment photos, case studies, videos, practical manual.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

SOIL FERTILITY, CONSERVATION AND GIS APPLICATIONS

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: SOIL FERTILITY, CONSERVATION AND GIS APPLICATIONS	COURSE CODE: AGT 225	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in soil fertility management, conservation techniques, and application of GIS and digital tools for sustainable land use and agricultural productivity.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know soil fertility and nutrient management techniques; 2.0 Comprehend soil conservation and land degradation control measures; 3.0 Appreciate GIS and spatial tools in soil and land management; 4.0 Understand integrated soil fertility and sustainable land use practices; 5.0 Know soil data analysis and digital decision-making tools.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: SOIL FERTILITY, CONSERVATION AND GIS APPLICATIONS			COURSE CODE: AGT 225		CONTACT HOURS: 4 HOUR/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and practical skills in soil fertility management, conservation techniques, and application of GIS and digital tools for sustainable land use and agricultural productivity.						
GENERAL OBJECTIVE 1.0: Know soil fertility and nutrient management techniques						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Explain concepts of soil fertility and productivity relationships 1.2 Explain macro, secondary and micronutrients and their interactions. 1.3 Explain soil nutrient dynamics 1.4 Describe soil testing and interpretation of laboratory results. 1.5 Explain nutrient mapping and variability in soil fertility. 1.6 Explain precision nutrient management approaches.	• Discuss concepts of soil fertility and productivity relationships • Describe macro, secondary and micronutrients and their interactions. • Discuss soil nutrient dynamics (mineralization, immobilization, leaching etc.) • Describe soil testing and interpretation of laboratory results. • Discuss nutrient mapping and variability in soil	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Soil samples, charts, lab reports	• Collect soil samples for testing. • Interpret soil test results and recommend fertilizer rates. • Apply organic and inorganic fertilizers appropriately. • Observe crop response to nutrient treatments. • Record soil fertility data • Analyze soil fertility data	Guide students to: • Collect soil samples for testing. • Interpret soil test results and recommend fertilizer rates. • Apply organic and inorganic fertilizers appropriately. • Observe crop response to nutrient treatments. • Record soil fertility data • Analyze soil	Soil sampling tools, Soil test kits fertilizers, compost, field plots. practical manual.

	1.7 Explain integrated nutrient management (INM) strategies. 1.8 Explain environmental impacts of nutrient mismanagement. 1.9 Describe role of organic amendments in soil fertility improvement	fertility. • Describe precision nutrient management approaches. • Discuss integrated nutrient management (INM) strategies • Discuss environmental impact of nutrient mismanagement. • Describe role of organic amendments in soil fertility improvement			fertility data	
General Objective 2.0: Comprehend soil conservation and land degradation control measures						
4 - 6	2.1 Explain concepts of soil erosion and land degradation processes 2.2 Explain types of erosion and their causes 2.3 State factors influencing soil erosion 2.4 Explain soil conservation techniques 2.5 Explain watershed management and land-use planning 2.6 Describe sustainable land management practices 2.7 Explain impact of land	• Discuss concepts of soil erosion and land degradation processes • Discuss types of erosion (sheet, rill, gully, wind etc.) and their causes • Describe factors influencing soil erosion (rainfall, slope, vegetation, soil type etc.) • Describe soil conservation techniques (contour farming, terracing,	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos, models, field examples, Maps of	• Write a report on a study visit to identify watershed in a landscape • Fly drone to describe landscape • Identify erosion features in field plots • Construct simple erosion control structures (bunds, ridges etc.) • Apply contour farming and	Guide students to: • Write a report on a study visit to identify watershed in a landscape • Fly drone to describe landscape • Identify erosion features in field plots • Construct simple erosion control structures	Farm tools, field plots, measuring tools, drones practical manual.

	degradation on agricultural productivity 2.8 Explain climate change effects on soil and land resources 2.9 Explain erosion control structures and their design principles	strip cropping etc.) • Discuss watershed management and land-use planning • Describe sustainable land management practices • Discuss impact of land degradation on agricultural productivity • Describe climate change effects on soil and land resources • Discuss erosion control structures and their design principles	landscape showing watershed, etc.	mulching techniques • Assess effectiveness of conservation practices • Record observations and improvements	(bunds, ridges etc.) • Apply contour farming and mulching techniques • Assess effectiveness of conservation practices • Record observations and improvements	
General Objective 3.0: Appreciate GIS and spatial tools in soil and land management						
7 – 9	3.1 Define GIS and 3.2 Explain GIS components in agricultural applications 3.2 Explain spatial data types. 3.3 Describe GPS and its role in land mapping 3.4 Explain applications of GIS in soil mapping and land use planning 3.5 Explain use of drone for arial mapping and	• Describe GIS and its components in agricultural applications • Discuss spatial data types (vector and raster data). • Describe GPS and its role in land mapping • Discuss applications of GIS in soil mapping and land use planning	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Maps, GPS devices, GIS	• Use GPS devices to collect coordinates • Map field plots using drones • Map field plots using simple GIS tools • Interpret spatial data and maps • Create basic maps for soil and land use • Apply GIS tools in land planning decisions	Guide students to: • Use GPS devices to collect coordinates • Map field plots using drones • Map field plots using simple GIS tools • Interpret spatial data and maps • Create basic maps for soil and	GPS devices, drones, computers, mapping software, practical manual.

	land use planning. 3.6 Describe remote sensing and its agricultural applications 3.7 Explain map reading and interpretation techniques 3.8 Describe use of GIS in precision agriculture 3.9 Explain benefits and limitations of GIS technologies. 3.10 Describe integration of GIS with farm management systems	• Describe use of drone for arial mapping and land use planning. • Describe remote sensing and its agricultural applications • Explain map reading and interpretation techniques • Describe use of GIS in precision agriculture • Explain benefits and limitations of GIS technologies. • Describe integration of GIS with farm management systems	software		land use • Apply GIS tools in land planning decisions	
General Objective 4.0: Understand integrated soil fertility and sustainable land use practices						
10 – 12	4.1 Explain integrated soil fertility management (ISFM) principles. 4.2 Describe sustainable land use practices. 4.3 Explain climate-smart soil management techniques. 4.4 Describe role of organic farming in soil sustainability. 4.5 Explain land-use	• Discuss integrated soil fertility management (ISFM) principles • Describe sustainable land use practices (crop rotation, agroforestry, cover cropping etc.) • Describe climate-smart soil management	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/ch arts Marker board, Marker, Pictures,	• Carry out planning • Implement crop rotation plans on field plots • Apply sustainable soil management practices • Demonstrate agroforestry or cover cropping techniques • Monitor soil	Guide students to: • Carry out planning • Implement crop rotation plans on field plots • Apply sustainable soil management practices • Demonstrate	Field plots, planting materials, practical manual etc.

	planning for sustainable agriculture. 4.6 Describe soil carbon management and sequestration. 4.7 Explain environmental impact of unsustainable practices. 4.8 Describe policy and regulations in land management. 4.9 Explain long-term soil productivity strategies.	techniques • Describe role of organic farming in soil sustainability • Discuss land-use planning for sustainable agriculture • Describe soil carbon management and sequestration • Discuss environmental impact of unsustainable practices • Describe policy and regulations in land management • Discuss long-term soil productivity strategies	soil data, case studies, etc.	improvement practices • Record sustainability indicators	agroforestry or cover cropping techniques • Monitor soil improvement practices • Record sustainability indicators	
General Objective 5.0: Know soil data analysis and digital decision-making tools						
13 – 15	5.1 Explain the role of data in soil and land management decisions 5.2 Highlight the methods of soil data collection and storage 5.3 Explain data analysis techniques for soil management 5.4 Explain digital tools for soil monitoring and decision-making	• Describe the role of data in soil and land management decisions • Describe the methods of soil data collection and storage • Explain data analysis techniques for soil management • Describe digital tools for soil monitoring	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos	• Analyze soil data using spreadsheets • Interpret soil information for farm decisions • Use digital tools for soil monitoring • Develop simple soil management plans • Present data-driven recommendations	Guide students to: • Analyze soil data using spreadsheets • Interpret soil information for farm decisions • Use digital tools for soil monitoring • Develop simple	Computers, mobile apps, decision-support systems (DSS) platforms, weather forecasting portals, Internet connectivity, practical manual.

	5.5 Explain interpretation of soil data for farm planning 5.6 Describe decision-support systems in soil management 5.7 Explain role of digital agriculture in sustainable land use 5.8 Describe challenges in soil data management 5.9 Explain strategies for improving data-driven decisions	and decision-making • Discuss interpretation of soil data for farm planning • Describe decision-support systems in soil management • Discuss role of digital agriculture in sustainable land use • Describe challenges in soil data management • Discuss strategies for improving data-driven decisions	Computers, datasets Apps, etc.		soil management plans • Present data-driven recommendations	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

AGRICULTURAL EXTENSION, DIGITAL ADVISORY SYSTEMS AND RURAL DEVELOPMENT

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: AGRICULTURAL EXTENSION, DIGITAL ADVISORY SYSTEMS AND RURAL DEVELOPMENT	COURSE CODE: AGT 226	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with knowledge and skills in agricultural extension methods, agricultural policies, Digital advisory systems, and rural development processes.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to:		
1.0 Understand agricultural extension methods and concepts; 2.0 Comprehend effective communication skills and advisory techniques in agricultural extension; 3.0 Know digital tools in extension services and platforms; 4.0 Understand community engagement techniques and participatory approaches to rural development strategies;		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: AGRICULTURAL EXTENSION, DIGITAL ADVISORY SYSTEMS AND RURAL DEVELOPMENT			COURSE CODE: AGT 226	CONTACT HOURS: 2 HOURS/WEEK		
			CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II			PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in agricultural extension methods, agricultural policies, Digital advisory systems, and rural development processes.						
GENERAL OBJECTIVES 1.0: Understand agricultural extension methods and concepts						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 3	1.1 Define agricultural extension 1.2 Explain agricultural extension role in technology transfer and rural development 1.3 Explain objectives and principles of agricultural extension services 1.4 Outline the types of extension systems 1.5 Explain roles and responsibilities of extension agents in farmer support 1.6 State the	• Explain agricultural extension and its role in technology transfer and rural development • Discuss objectives and principles of agricultural extension services • Describe types of extension systems (public, private, NGO-based, pluralistic systems etc) • Describe the roles and responsibilities of extension agents in farmer support	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos case studies, etc.	• Identify extension services available in local communities • Conduct simple field inquiry or interview (real/simulated) on extension services • Analyze roles of extension agents using case scenarios • Present findings in group discussions • Compare different extension systems based on effectiveness • Conduct simple extension	Guide students to: • Identify extension services available in local communities • Conduct simple field inquiry or interview (real/simulated) on extension services • Analyze roles of extension agents using case scenarios • Present findings in group	Case studies, notebooks, community reports, practical manual.

	characteristics of effective extension delivery systems 1.7 Explain linkage between research, extension and farmers 1.8 List the challenges facing extension services in developing countries 1.9 Explain importance of extension in improving agricultural productivity and livelihoods 1.10 Describe individual extension methods 1.11 Describe group extension methods 1.12 Describe mass extension methods 1.13 States the advantages and limitations of each method 1.14 Describe demonstration techniques (method and result demonstration) 1.15 Explain participatory approaches in	• Discuss the characteristics of effective extension delivery systems • Explain linkage between research, extension and farmers • Discuss challenges facing extension services in developing countries • Explain importance of extension in improving agricultural productivity and livelihoods • Describe individual extension methods (farm/home visit, advisory services) • Describe group extension methods (meetings, demonstrations, farmer field schools etc) • Describe mass extension methods (radio, television, social media etc) • Explain advantages and limitations of		demonstrations (method/result demonstration) • Practice delivering extension messages using different methods • Organize group discussions as extension meetings • Evaluate effectiveness of extension methods used • Apply participatory approaches in group activities	discussions • Compare different extension systems based on effectiveness • Conduct simple extension demonstrations (method/result demonstration) • Practice delivering extension messages using different methods • Organize group discussions as extension meetings • Evaluate effectiveness of extension methods used • Apply participatory approaches in group activities	
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	extension (farmer involvement, PRA)	each method				
1.16	Describe importance of selecting appropriate extension methods	• Describe demonstration techniques (method and result demonstration) • Discuss participatory approaches in extension (farmer involvement, PRA) • Describe importance of selecting appropriate extension methods				
General Objective 2.0: Comprehend effective communication skills and advisory techniques in agricultural extension						
4 - 6	2.1 Define communication and explain its importance in agricultural extension	• Explain communication concepts using practical examples.	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts	• Practice role-play of extension agent and farmer interaction. • Demonstrate verbal and non-verbal communication skills	Guide students to:	Role-play materials, scripts communication models, practical manual etc.
	2.2 Explain components of communication process (sender, message, channel, receiver, feedback, noise).	• Describe communication process using diagrams.	Marker board, Marker, Pictures, Videos	• Identify communication barriers in simulated scenarios • Present agricultural messages clearly to target audience.	• Practice communication skills • Assess performance	
	2.3 Explain types of communication (verbal, non-verbal, written, visual)	• Describe communication scenarios (farmer-extension interaction) • Discuss barriers in local communication settings	Communication models, etc.	• Practice active listening and feedback techniques • Evaluate	• Provide detailed feedback and corrections • Reinforce effective communication techniques	
	2.4 Explain barriers to effective	• Describe effective listening and feedback			• Organize and	

	communication and strategies to overcome them.	techniques.		effectiveness of communication in group exercises	supervise simulation activities	
2.5	Explain effective communication skills (listening, clarity, empathy, feedback).	• Discuss concepts through questioning and discussion. • Explain community engagement using real-life examples.		• Conduct simulated community meetings or farmer group discussions	• Guide students in PRA exercises	
2.6	Explain principles of adult learning in extension communication.	• Describe PRA tools using case studies • Discuss farmer group dynamics and leadership.		• Apply PRA tools (mapping, ranking exercises)	• Provide feedback on engagement skills	
2.7	Explain cultural and social factors affecting communication.	• Discuss conflict resolution strategies.		• Practice advisory services through role-play		
2.8	Explain importance of feedback in extension communication.			• Demonstrate conflict resolution and negotiation skills		
2.9	Explain importance of community engagement in agricultural extension			• Evaluate effectiveness of engagement strategies		
2.10	Describe methods of working with farmers and farmer groups					
2.11	Explain participatory rural appraisal (PRA) techniques (mapping, ranking, transect walk)					
2.12	Describe advisory					

	services and farmer support systems 2.13 Explain conflict resolution and negotiation techniques in extension. 2.14 Explain gender and inclusiveness in extension services. 2.15 Explain leadership and group dynamics in farmer organizations. 2.16 Describe strategies for effective farmer engagement and participation.					
General Objective 3.0: Know digital tools in extension services and platforms						
7 – 10	3.1 Explain role of ICT in modern agricultural extension. 3.2 Explain ICT tools used in extension (mobile phones, radio, TV, internet, mobile apps etc.). 3.3 Explain digital advisory services and platforms. 3.4 Explain advantages of ICT in information	• Explain ICT tools using real-life examples • Discuss the use of mobile apps and digital platforms • Discuss benefits and limitations of ICT in extension. • Describe examples of digital advisory systems. • Explain ethical and	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Videos	• Use mobile devices to access agricultural information. • Demonstrate use of apps for advisory services. • Share agricultural information via digital platforms • Evaluate effectiveness of ICT tools in extension delivery.	Guide students to: • Use mobile devices to access agricultural information. • Demonstrate use of apps for advisory services. • Share agricultural information via digital platforms	Mobile phones, apps, internet, practical manual, etc.

	dissemination and farmer support 3.5 Explain challenges in ICT adoption in rural areas. 3.6 Explain ethical and responsible use of ICT in communication. 3.7 Explain role of social media in agricultural extension. 3.8 Explain data sharing and information management in extension. 3.9 Explain integration of ICT with traditional extension methods 3.10 Explain future trends in digital extension.	responsible use of ICT in communication. • Discuss future trends in digital extension	Mobile devices, etc.	• Practice responsible and ethical use of ICT	• Evaluate effectiveness of ICT tools in extension delivery. • Practice responsible and ethical use of ICT.	
General Objective 4.0: Understand community engagement techniques and participatory approaches to rural development strategies						
11 – 15	4.1 Explain rural development concepts and objectives. 4.2 Explain rural livelihoods and socio-economic factors. 4.3 Explain participatory development approaches (PRA). 4.4 Explain community	• Discuss rural development concepts and objectives. • Discuss rural livelihoods and socio-economic factors. • Discuss participatory development approaches (PRA).	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker,	• Conduct PRA exercises (mapping, ranking etc). • Simulate community meetings • Develop community engagement plans. • Practice conflict resolution. • Evaluate development	Guide students: • Conduct PRA exercises (mapping, ranking etc). • Simulate community meetings • Develop community engagement	PRA materials, practical manual, etc.

	engagement and mobilization techniques. 4.5 Explain gender and inclusiveness in rural development. 4.6 Explain farmers group formation and management. 4.7 Explain leadership and group dynamics. 4.8 Explain conflict management in communities. 4.9 Describe role of NGOs and community organizations. 4.10 Explain sustainability in rural development. 4.11 Describe farmer field schools and learning platforms.	• Discuss community engagement and mobilization techniques. • Discuss gender and inclusiveness in rural development. • Describe farmers group formation and management. • Describe leadership and group dynamics. • Describe conflict management in communities. • Describe role of NGOs and community organizations. • Discuss sustainability in rural development. • Describe farmer field schools and learning platforms.	Pictures, Videos, PRA tools, etc.	strategies	plans. • Practice conflict resolution. • Evaluate development strategies	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

BASIC PLANT HEALTH MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: BASIC PLANT HEALTH MANAGEMENT	COURSE CODE: AGT 227	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to provide students with knowledge and skills of plant health concepts, identification of common field and post-harvest pests and diseases of crops in Nigeria.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand concepts of plant health and pest categories; 2.0 Know major field insect pests and diseases of crops in Nigeria; 3.0 Know major post-harvest insect pests and diseases; 4.0 Comprehend Integrated Pest Management (IPM); 5.0 Understand integrated post-harvest pest management and modern hermetic storage.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: BASIC PLANT HEALTH MANAGEMENT			COURSE CODE: AGT 227		CONTACT HOURS: 3 HOUR/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to provide students with knowledge and skills of plant health concepts, identification of common field and post-harvest pests and diseases of crops in Nigeria.						
GENERAL OBJECTIVE 1.0: Understand concepts of plant health and pest categories						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1- 3	1.1 Define plant health, pest, disease, weed. 1.2 Distinguish biotic from abiotic stress. 1.3 Explain the classification of pests: (insects, mites, nematodes, vertebrates rodents, birds etc), pathogens (fungi, bacteria, viruses etc), weeds 1.4 Define pest status: key pest, occasional pest, secondary pest, minor pest etc. 1.5 Explain economic	• Explain each term; plant health as freedom from biotic/abiotic stress • Discuss the classification of the following with examples: (insect e.g. army worm, Tuta, etc), mite e.g. red spider mite, etc, nematode e.g. root-knot, etc vertebrate e.g. cane rats, quelea, etc, pathogen (CMD virus), weed (Striga) • Explain how pest status changes with season, location,	Plant pathology and entomology textbooks, IITA/IAR pest reference, FAOSTAT loss data, fresh damaged plant samples, LCD projector	• Sketch the map of school farm and surrounding area • Identify different pest categories with photographs and brief notes on damage • Visit a granary, market or storage facility. • Identify common post-harvest pests and damage symptoms and document • Document a report	Guide students to: • Walk through the school farm and surrounding area • Identify different pest categories with photographs and brief notes on damage • Visit a granary, market or storage facility. • Identify common post-harvest pests and damage symptoms and document • Document a report	School farm, smartphones for photographs, identification guide; granary/ market/ storage facility, smartphone, notebook, practical manual.

	impact of field and post-harvest pests in Nigeria	cropping system; show case studies • Discuss field losses in unmanaged plots and post-harvest losses in cereals, fruits/vegetables				
General Objective 2.0: Know major field insect pests and diseases of crops in Nigeria						
4 – 7	2.1 Explain major pests of cereals: stem borers, Fall armyworm, maize leafhopper, grain weevils, etc. 2.2 Explain major pests of legumes: thrips (Megalurothrips), pod-borer bruchids, aphids etc. 2.3 Explain major pests of vegetables on tomato, fruit fly, leaf miner, whitefly, etc. 2.4 Explain major pests of root/tubers and tree crops:	• Describe biology, life cycle and feeding habits. • Discuss pod borer larva; bruchid in seeds; aphids on stems, etc. • Describe serpentine mining; fruit fly oviposition; leaf miner damage; whitefly virus transmission. • Discuss some major insect pests of root and tubers; cassava mealybug, green mite, sweet potato weevil; cocoa capsid.	Pest photograph cards, damage symptom guide, IITA pest reference, fresh damaged plant samples, hand lens, LCD projector, mobile app Etc.	• Identify major field insect pests from photographs and preserved specimens. • Record host crop, damage type, life stage causing damage. • Collect insect specimens from different crop fields using sweep net or hand collection • Identify insects • Preserve in alcohol.	Guide students to: • Identify major field insect pests from photographs and preserved specimens. • Record host crop, damage type, life stage causing damage. • Collect insect specimens from different crop fields using sweep net or hand collection. • Identify and preserve in alcohol.	Pest photographs, preserved specimens, identification key, hand lens; sweep nets, collection bottles, 70% ethanol, labels, microscope, mobile app, practical manual.

	cassava mealybug, green mite, sweet potato weevil, cocoa mirids, citrus psyllid, etc. 2.5 Explain major pests of economic tree crops					
General Objective 3.0: Know major post-harvest insect pests and diseases						
8 – 11	3.1 Explain major stored-product insect pests. 3.2 Describe cowpea weevils, groundnut weevils. 3.3 Explain rodent pests (rats, mice) and bird pests (quelea, weaver birds). 3.4 Explain fungal storage pests and aflatoxin- producing fungi	• Describe major stored-product insect pests: maize weevil rice weevil Larger Grain Borer Angoumois grain moth etc. • Describe Callosobruchus oviposition on cowpea; emergence holes; weight and quality loss • Describe rodent damage in stores; quelea bird damage in cereal fields.	Stored-product pest photographs, infested grain samples, hand lens, microscope, Afla Safe brochure, aflatoxin test strips, LCD projector Etc.	• Set up a Cowpea weevil rearing in cowpea seeds in jars; • Record stages and damage over 4 weeks • Identify 12 stored-product pests from photographs and preserved samples; • Record host commodity and damage • Use aflatoxin lateral-flow strip on a stored maize/groundnut sample; • Interpret results	Guide student to: • Set up a Cowpea weevil rearing in cowpea seeds in jars; • Record stages and damage over 4 weeks • Identify 12 stored-product pests from photographs and preserved samples; • Record host commodity and damage • Use aflatoxin lateral-flow strip on a stored maize/groundnut	Cowpea seeds, jars with mesh, hand lens; pest photographs, preserved samples, microscope; aflatoxin strip kit, grain samples, water, practical manual.

					sample; • Interpret results	
General Objective 4.0: Comprehend Integrated Pest Management (IPM);						
12-13	4.1 Define IPM principles: prevention, monitoring, intervention only when necessary; economic threshold (ET). 4.2 Explain cultural control: rotation, sanitation, planting time, resistant varieties (SAMMAZ, IT-cowpea) 4.3 Explain biological control: predators, parasitoids (Trichogramma), pathogens (Bt, NPV, Beauveria) 4.4 Explain chemical control safely: herbicide groups insecticide	• Explain IPM; • Explain decision pyramid • Describe ET concept • Discuss rotation against pests; sanitation; resistant varieties; trap crops • Describe Trichogramma egg cards • Describe biological control agents • Discuss groups of insecticides demonstrate the use of mobile apps or drones for pest infestation monitoring;	IPM textbooks, IITA biocontrol guide, Bacillus thuringiensis (Bt) and Beauveria products, knapsack sprayer, PPE, smartphones with relevant apps LCD projector	• Set up a pheromone trap with app on crops plot; • Record weekly catches for 4 weeks • Apply control when threshold is exceeded • Apply biological control agents or products • Compare with untreated control • Use mobile apps, drones to scout and identify pests/diseases on different crop fields • Recommend IPM management	Guide students to: • Set up a pheromone trap with app on crops plot; • Record weekly catches for 4 weeks • Apply control when threshold is exceeded • Apply biological control agents or products • Compare with untreated control • Use mobile apps, drones to scout and identify pests/diseases on different crop fields • Recommend IPM management	Ginger rhizomes, scent leaf cuttings, lemon grass slips, school farm, watering can; harvesting tools, drying mat, packaging materials, practical manual.
General Objective 5.0: Understand integrated post-harvest pest management and modern hermetic storage.						
14– 15	5.1 Explain the application pre-	•Discuss the application pre-storage measures:	Moisture meter, drying area,	•Pack cowpea in PICS hermetic bags and	Guide students to: • Pack cowpea in	Cowpea, PICS bags, jute

	storage measures: harvest at correct moisture content (MC), cleaning, drying to 13% MC 5.2 Explain the application of traditional and modern storage: jute bags, metal silos, hermetic bags (PICS, cocoons etc 5.3 Explain chemical treatment: Synthetic insecticides dust (1 g/kg) for cowpea; Phostoxin fumigation for grain stores 5.4 Explain biological and physical control: biocontrol, solar heat treatment, neem-based botanicals, rodent bait stations, bird netting	harvest at correct moisture content (MC), cleaning, drying to 13% MC • Discuss the application of traditional and modern storage: jute bags, metal silos, hermetic bags (PICS, cocoons etc • Discuss chemical treatment: Synthetic insecticides dust (1 g/kg) for cowpea; Phostoxin fumigation for grain stores • Discuss biological and physical control: biocontrol, solar heat treatment, neem-based botanicals, rodent bait stations, bird netting	hermetic bags Purdue Improved Crop Storage (PICS), metal silo, Synthetic insecticides dust, neem leaves, rodent traps, bird netting, LCD projector	• Weigh after some weeks • Assess weevil damage and weight loss • Calculate postharvest Loss (PHL) • Apply insecticides to a groundnut plot at flowering • Harvest, dry and test for aflatoxin using strip • Compare with untreated control • Set up rodent bait station and bird netting on a cereal storage; observe effectiveness after some weeks	PICS hermetic bags and • Weigh after some weeks • Assess weevil damage and weight loss • Calculate postharvest Loss (PHL) • Apply insecticides to a groundnut plot at flowering • Harvest, dry and test for aflatoxin using strip • Compare with untreated control • Set up rodent bait station and bird netting on a cereal storage; observe effectiveness after some weeks	bags, Synthetic insecticides dust, weighing scale; botanical product, groundnut plot, aflatoxin strip kit; rodent bait, traps, bird netting, storage facility, practical manual.
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COURSE ASSESSMENT:

Course work:	10%
Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	100%



AGRICULTURAL ECONOMICS AND VALUE CHAIN SYSTEMS

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: AGRICULTURAL ECONOMICS AND VALUE CHAIN SYSTEMS	COURSE CODE: AGT 228	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with knowledge and skills in agricultural economics, value chain systems and market-oriented decision-making in agricultural enterprises.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand basic concepts and principles of agricultural economics; 2.0 Know factors of production and their efficient use in agriculture; 3.0 Understand the principles of demand, supply and price determination in agricultural markets 4.0 Know agricultural marketing systems and price determination 5.0 Understand marketing channels and value chain systems; 6.0 Know marketing challenges and propose solutions; 7.0 Understand value addition and agribusiness opportunities.		

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: AGRICULTURAL ECONOMICS AND VALUE CHAIN SYSTEMS			COURSE CODE: AGT 228		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 2		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 1 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in agricultural economics for efficient resource use, decision-making, and profitability in agricultural enterprises.						
GENERAL OBJECTIVE 1.0: Understand basic concepts and principles of agricultural economics						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 -2	1.1 Define agricultural economics 1.2 Explain scope of agricultural economics in agricultural production and agribusiness 1.3 Explain basic economic concepts (scarcity, choice, opportunity cost, scale of preference) with agricultural examples 1.4 Distinguish between microeconomics and macroeconomics in relation to agriculture 1.5 Explain the roles of agriculture in economic	• Explain agricultural economics • Discuss scope of agricultural economics in agricultural production and agribusiness • Discuss basic economic concepts (scarcity, choice, opportunity cost, scale of preference) with agricultural examples • Discuss the differences between microeconomics and macroeconomics in relation to agriculture	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Board illustrations, etc.			

	development (food security, employment, raw materials, income generation) 1.6 Explain fundamental economic problems in agriculture (limited resources, production constraints, market challenges) 1.7 Describe decision-making processes in farm management under resource constraints	• Describe the roles of agriculture in economic development (food security, employment, raw materials, income generation) • Discuss fundamental economic problems in agriculture (limited resources, production constraints, market challenges) • Describe decision-making processes in farm management under resource constraints				
General Objective 2.0: Know factors of production and their efficient use in agriculture						
3-4	2.1 Explain the factors of production (land, labour, capital, management) in agriculture 2.2 Describe characteristics and importance of each factor in farm production 2.3 Explain the concept of resource allocation and efficiency in	• Discuss the factors of production (land, labour, capital, management) in agriculture • Describe characteristics and importance of each factor in farm production • Discuss the concept of resource allocation and efficiency in	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, etc.			

	agriculture 2.4 Explain the law of diminishing returns in agricultural production 2.5 Describe ways of improving efficiency in the use of farm resources 2.6 Explain relationships between inputs and outputs in farm production (production function)	agriculture • Explain the law of diminishing returns in agricultural production • Describe ways of improving efficiency in the use of farm resources • Discuss relationships between inputs and outputs in farm production (production function)				
General Objective 3.0: Understand the principles of demand, supply and price determination in agricultural markets						
3-4	3.1 Define demand and supply in agricultural markets 3.2 Explain factors affecting demand 3.3 Explain factors affecting supply 3.4 Explain demand and supply curves 3.5 Explain price determination using demand and supply interaction 3.6 Describe causes of price fluctuations in agricultural products	• Explain demand and supply in agricultural markets • Discuss factors affecting demand (income, price, taste, population etc) • Explain factors affecting supply (input cost, weather, technology) • Discuss demand and supply curves • Explain price determination using demand and supply	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, illustrations real-life examples, etc.			

		interaction • Describe causes of price fluctuations in agricultural products				
General Objective 4.0: Understand agricultural marketing systems and price determination						
5-6	4.1 Define agricultural marketing 4.2 Describe types of agricultural markets and their features 4.3 Explain the importance of agricultural marketing in agricultural production 4.4 Describe marketing channels for agricultural products 4.5 Explain factors affecting demand and supply of agricultural products 4.6 Explain price determination and price fluctuation in agricultural markets 4.7 State marketing functions 4.8 Explain common marketing problems in agriculture.	• Explain agricultural marketing • Discuss types of agricultural markets (Digital and physical) and their features • Discuss the importance of agricultural marketing in agricultural production • Describe marketing channels for agricultural products (producer → wholesaler → retailer → consumer) • Explain factors affecting demand and supply of agricultural products • Discuss price determination and price fluctuation in agricultural markets • Describe marketing functions (storage,	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, illustrations, real-life examples, etc.			

		transportation, processing, packaging, grading, distribution) • Discuss common marketing problems in agriculture (poor storage, transportation challenges, price instability)				
General Objective 5.0: Understand marketing channels and value chain systems						
7-8	5.1 Explain characteristics of agricultural products affecting marketing. 5.2 Explain marketing channels in agriculture 5.3 Describe stages in agricultural value chains. 5.4 State key actors in the value chain 5.5 Explain functions and roles of each actor in the value chain 5.6 Describe factors influencing choice of marketing channels (cost, distance, product type, market access)	• Explain marketing channels using diagrams (farm → market → consumer) • Break down value chain stages using real agricultural products (e.g., rice, maize, vegetables, livestock, etc). • Use examples to show roles of different actors • Compare direct vs indirect marketing channels • Explain marketing using real market examples • Explain branding and packaging concepts	Textbooks, Journals, Internet, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, illustrations, real-life examples, etc.	• Map the value chain of a selected agricultural product (e.g., rice, tomatoes, livestock, etc). • Identify all actors involved in the chain • Draw a flow diagram showing movement of product through the value chain • Analyze roles of each actor and value added at each stage • Develop marketing strategies • Design product branding and packaging • Analyze market demand and	Guide students to: • Map the value chain of a selected agricultural product (e.g., rice, tomatoes, livestock, etc). • Identify all actors involved in the chain • Draw a flow diagram showing movement of product through the value chain • Analyze roles of each actor and value added at each stage • Develop	Case study sheets, charts, notebooks, practical manual.

	5.7 Explain marketing concepts and strategies 5.8 Describe branding, packaging and product positioning 5.9 Explain market analysis and segmentation 5.10 Describe pricing strategies and competition analysis 5.11 Describe distribution channels and logistics 5.12 Explain customer engagement strategies 5.13 Explain sales management techniques	Describe how products move within the communities		competition - Promote products using digital tools - Present marketing plans.	marketing strategies - Design product branding and packaging - Analyze market demand and competition - Promote products using digital tools - Present marketing plans.	
General Objective 6.0: Know marketing challenges and propose solutions						
9-11	6.1 Explain common marketing challenges in agriculture. 6.2 Explain causes and effects of post-harvest losses in agricultural products 6.3 Describe infrastructure and institutional constraints affecting agricultural marketing 6.4 Explain the role of	- Discuss common marketing challenges in agriculture (poor storage, transportation constraints, price instability, lack of market information, etc). - Discuss causes and effects of post-harvest losses in agricultural products	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures,	- Identify marketing challenges affecting selected agricultural products in local or simulated markets - Analyze causes and impacts of post-harvest losses - Develop practical solutions to identified marketing problems - Develop simple	Guide students to: - Identify marketing challenges affecting selected agricultural products in local or simulated markets - Analyze causes and impacts of post-harvest	Case study sheets, notebooks, charts, practical manual.

	government policies and market regulations in agricultural marketing 6.5 Describe strategies for improving marketing efficiency.	• Describe infrastructure and institutional constraints affecting agricultural marketing • Discuss the role of government policies and market regulations in agricultural marketing • Describe strategies for improving marketing efficiency (storage, processing, market information systems, cooperatives)	illustrations, real-life examples, etc.	improvement plans for selected value chains • Present findings and justify proposed solutions through slide presentation.	losses • Develop practical solutions to identified marketing problems • Develop simple improvement plans for selected value chains • Present findings and justify proposed solutions through slide presentation.	
General Objective 7.0: Understand value addition and agribusiness opportunities.						
12-15	7.1 Explain the concept of value addition in agriculture 7.2 Describe methods of value addition (processing, packaging, grading, branding) 7.3 Explain benefits of value addition to farmers and agribusiness (increased income, reduced losses, market access) 7.4 Explain agribusiness opportunities along	• Explain value addition using familiar products (e.g., cassava → garri, milk → yogurt, etc). • Discuss different forms of value addition using real-life examples • Discuss how value addition increases product value and reduces losses • Discuss agribusiness opportunities within	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts, Marker board, Marker, Pictures, Board illustrations, real-life	• Identify value-added products from selected agricultural commodities • Analyze value addition stages in a selected value chain • Develop a simple agribusiness idea based on local resources • Prepare a basic value addition plan (product, process, market, equipment,	Guide students to: • Identify value-added products from selected agricultural commodities • Analyze value addition stages in a selected value chain • Develop a simple agribusiness idea based on local resources • Prepare a basic	Samples of products, packaging materials, charts, practical manual.

	agricultural value chains 7.5 Describe basic requirements for starting small agribusiness enterprises	local communities • Discuss basic requirements for small agribusiness setup (capital, skills, market, etc).	examples processed product, etc.	etc). • Carry out simple processing, packaging and marketing where possible	value addition plan (product, process, market, equipment, etc). • Carry out simple processing, packaging and marketing where possible	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

LIST OF MINIMUM RESOURCES / PHYSICAL FACILITIES

a. Microbiology, Entomology and Pathology Laboratory

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Autoclave	1
2.	Refrigerator	1
3.	Freezer	1
4.	Platinum wire loops	30
5.	Incubator	1
6.	Anaerobic jar	2
7.	Lovibond colour comparators	2
8.	Milk sampling outfit	2
9.	Colony counter	1
10.	Centrifuge	2
11.	Water bath	1
12.	Electronic balance (Digital and manual)	2
13.	Microscopes: • Simple • Compound • Digital screen	2 (each)
14.	Microscope slides and cover slips (box)	20
15.	Staining troughs	15
16.	Magnifying glasses	15
17.	Insect cages and cabinets	5
18.	Specimen bottles	20
19.	Insect nets	30
20.	Lamps	10
21.	Mist nets	10
22.	Cool boxes	10
23.	PPE (Lab coat, gloves, boot etc.)	20(set)
24.	Petri dishes (glass and plastic)	Assorted

25.	Insect killing jars	10
26.	First aid kit (chemical exposure)	1
27.	IPM decision threshold reference cards	20

b. Animal/Plant Nutrition Laboratory

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Oven	1
2.	Centrifuge	1
3.	Digital Weighing balance (0.01g)	2
4.	Desiccator	2
5.	Pestle and mortar	2
6.	Flask shaker	2
7.	Kjeldahl nitrogen determination apparatus	1
8.	Grinder/blender	1
9.	Colorimeter/Spectrophotometer	1
10.	Colony counter	1
11.	Soxhlet extraction apparatus	2
12.	Reagent (proximate analysis)	1sets
13.	Refrigerator	1
14.	Hot plates	5
15.	Digital thermometer	2
16.	Chemical balance (0.01g)	2
17.	PPE (Lab coat, gloves, boot etc.)	20 set
18.	Sample collection bottles	2
19.	First aid kit (chemical exposure)	1

c. Soil Laboratory

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Drying oven soils	1
2.	Digital pH metre	1
3.	Electric furnace	1

4.	Electric balance	2
5.	Beam balance	2
6.	Soil sieve (mesh)	2
7.	Soil sedimentation apparatus	2
8.	Soil capillary determination	2
9.	Soil humidity determination apparatus	2
10.	Soil testing outfit	3
11.	Soil augers (bucket, screw, and Dutch types)	5
12.	Humidity cabinet	1
13.	Soil moisture meter	2
14.	Soil salt tester	1
15.	Portable digital pH meters	4
16.	GPS devices	1
17.	GPS-enabled smartphones or tablets	5
18.	First aid kit	1

d. Drawing Room:

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Drawing boards and tables	20
2.	Drafting set	5
3.	T square	10
4.	Set square	10
5.	Protractors	10
6.	Lettering set	10

e. Meteorological Station

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Stevensons screen	1
2.	Thermo hydrographs	1
3.	Maximum and minimum thermometer	2
4.	Digital thermometer	2

5.	Rain gauge	2
6.	Measuring glasses	2
7.	Wind vane	1
8.	Anemometers	2
9.	Evaporimeters	2
10.	Hygrometers (digital and manual)	2
11.	Barometers	2
12.	Automated weather station	1
13.	Climate data records — Nigeria (30-year)	1 set
14.	Climate change maps and charts (Nigeria)	1 set
15.	Drought and flood risk maps (agro-ecological zones)	1 set
16.	Computer with NIMET data analysis software	1

f. Audio Visual Room

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Seminar / training room (seats 40 students)	1
2.	Video recorder	2
3.	Slide projector	2
4.	Overhead projector	2
5.	Film projector	2
6.	Magnetic board	2
7.	Public address system	1
8.	Television set	2
9.	Cameras	5
10.	Enlarger	1
11.	Photo dryer	1
12.	Photo cutter	1
13.	Tables for drawing	5
14.	Water colours	2 set
15.	Drawing pencils	2 set
16.	Drawing pens	2 set

17.	Display cabinets and boards	2
18.	Interactive smartboard	1
19.	Laptop (for presentation)	2
20.	Printer	1
21.	Calculator sets (scientific)	20

g. Pest Control Equipment Store

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Knapsack pressure sprayer	2
2.	Motorized mist sprayer	1
3.	Handy sprayer	5
4.	Hand sprayer with container	5
5.	Flood jet nozzles (1.5 Ok)	4
6.	Boom sprayer	2
7.	PPE for chemical application (gloves, masks, goggles, overalls, boots)	20 full sets

h. Farm Machinery Shed

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Tractors	2
2.	Tractor operation and maintenance manuals	1 set
3.	Power tillers	2
4.	Disc plough	2
5.	Disc harrows	2
6.	Disc ridgers	2
7.	4 Wheel trailer	2
8.	Stump jumper	2
9.	Earth scoop	1
10.	Rotovators	1
11.	Versaflex cultivators	1

12.	Mould board ridge	2
13.	Tractor winch	2
14.	Tractor pulley	2
15.	Versa file seed loader	2
16.	Seed drill	2
17.	Combine harvester	2
18.	Seed cleaner	1
19.	Seed grader	2
20.	Hay baler	1
21.	Cutter bay mower	1
22.	Rotary slasher	1
23.	Fertilizer spreader	1
24.	Cereal thresher	1
25.	Forage shredder with cut hood	1
26.	Sub soiler	2
27.	Versatile mould board plough	3
28.	Manual maize planter	2
29.	Spike tooth harrow	1
30.	Rice planter	2
31.	Root cutter	1
32.	Interrow weeder	1
33.	Manure spreader	

i. Crop Storage and Processing

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Rice milling machine	1
2.	Rice thresher	1
3.	Rice parboil machine	1
4.	Groundnut decorticator	1
5.	Maize sheller	1
6.	Hand oil press	1

7.	Grain drier	1
8.	Cassava peeler	1
9.	Cassava grater	1
10.	Silos	Assorted
11.	Cribs (traditional and improved)	Various
12.	Yam barns	Various
13.	Rhombus	various
14.	Refrigerated warehouse/ Cold room	1
15.	Garri fryer	1
16.	Palm oil press (hand-operated)	1
17.	PICS hermetic bags (assorted sizes)	Assorted
18.	Weighing scales (0–100 kg platform)	4
19.	Food safety PPE (aprons, gloves, hair nets, masks)	40 sets
20.	Laboratory thermometer (food processing)	6
21.	pH meter (food grade)	2

j. Nursery Tools Store

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Watering system (spraying)	5
2.	Seed sowers	5
3.	Root pruners	5
4.	Plant lifters	5
5.	Flame weeder and hedgers	5
6.	G.H.P. pump	5
7.	Secateurs	2
8.	Planting hoes	10
9.	Spade	10
10.	Pick axe	10
11.	Hand trowel	10
12.	Wheelbarrows	10
13.	Watering cans	10

14.	Head pans	10
15.	Matchets/cutlasses	10
16.	Budding and grafting knives	10
17.	Rakes	10
18.	Measuring tape (30m)	6
19.	Pegs and string (plot marking)	2 sets
20.	Germination testing equipment (germination tray, filter paper)	2 sets
21.	Shade nets (50% and 80%)	5 rolls
22.	Polythene pots (assorted sizes)	200
23.	Black polythene bags (nursery, assorted)	500
24.	Seed storage cabinet (labelled, airtight containers)	1

k. Wood/Metal/Maintenance Workshop:

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
	WOODWORK SECTION	10
1.	Working benches with vice	2
2.	Band saw	2
3.	Surface planer	2
4.	Thickness planer	1
5.	Drilling machine	2
	HAND TOOLS	
6.	Saws, chisel, Tee square, gauges, rulers, screwdrivers, set of drin bit hammers, pincers, oil stones, planners etc.	15
	METAL WORK SECTION:	
7.	Lathe machine	1
8.	Pipe benders	3
9.	Anvils	3
10.	Micrometers (insides, outside)	1
11.	Stock and dice set	5
12.	Drill sets	5

13.	Electrical hand drills	2
14.	Hydraulic jack 12 and 15 tons	1
15.	Tool boxes	5
16.	Box of drill	4
17.	Battery charger	1
18.	Grease gun	2
19.	Pipe cutters	1
20.	Scribers	1
21.	Steel ruler	5
22.	Mallet sets	2
23.	Pipe screwing – threading	2
24.	Arch welding equipment working benches	8
25.	Arc welder	42
26.	Electric grinder	2
27.	Welding gloves	15
28.	Welding helmet	15
29.	Wire brush	5
30.	Welding boots and screen Soldering equipment	15
31.	Blow torch	3
32.	Tin snips	4
33.	Soldering flux	4
34.	Sheet metal sheer	4
35.	Mallet hammer	4
36.	Hack saw	4
37.	Oxygen and acetylene bottles	4
38.	Oxygen and acetylene regulator	2
39.	Cylinder wrenches	2
40.	Spark lighter	3
	MAINTENANCE WORKSHOP	
41.	Tool boxes	5
42.	Hydraulic jack	2

43.	Service pit	1
44.	Tool boxes	5
45.	Teaching model or scraps of Tractors engines	5
46.	Trailers	2
47.	Plough	2
48.	Other farm implements.	

1. Irrigation Equipment

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Sprinkler irrigation kit	2 sets
2.	Micro-sprinklers (assorted)	30
3.	Irrigation hoses (assorted lengths and diameters)	5 rolls
4.	Rotating sprinkler for 5 acres	103
5.	Big boss irrigation gun for 20 acres	10
6.	Centre pivot irrigation system for 20 acres	1
7.	Current meter	2
8.	Irrigation water tester	2
9.	Electric motor pump	1
10.	Drip irrigation kit (complete system, 1 acre)	2 sets
11.	Sprinkler irrigation kit (rotating sprinklers)	2 sets
12.	Irrigation pipes (PVC, assorted)	Stock
13.	Soil moisture probes (digital)	6
14.	Rainwater harvesting tank (5,000L)	2
15.	Contour marking equipment (A-frame or optical level)	4
16.	Water conservation demonstration plots (tied ridges, basins)	4 plots
17.	Evaporation pan (Class A)	2
18.	Levelling instrument (builders level or optical level)	2
19.	Basin irrigation markers (pegs and rope)	2 sets
20.	Furrow irrigation tools (ridger, furrow opener)	1 set
21.	Portable ETc calculation chart (FAO Penman-Monteith)	5 sets

m. Crop Farm (Teaching and Commercial)

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Orchard	10
2.	Sprinkler irrigation kit 2,000	10
3.	Crop farm • Tubers • Cereals • Grains	100
4.	Fertilizer store	1
5.	Manure store	2
6.	Implement store	1

n. Animal farm (Teaching and Commercial)

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
	POULTRY	
1.	Laying unit	1,000 capacity
2.	Brooder unit	1,000 capacity
3.	Deep litter	1,000 capacity
4.	Hatchery	1
5.	Incubators	3
6.	Candler (egg candling lamp)	2
7.	Drinkers (poultry, nipple and trough types)	50
8.	Feeders (poultry, trough and tube types)	50
9.	Weighing scale (poultry, 5kg)	4
10.	Vaccination equipment (syringe, eye dropper, wing web applicator)	2 sets
11.	Debeaking equipment	1
12.	Egg washing and grading equipment	1 set
13.	Egg tray	50
14.	Sheep unit	80
15.	Rabbitry	80
16.	Piggery	80
17.	Beef cattle	50

18.	Dairy cattle	50
19.	Milking parlour	1
20.	Slaughter house with slab	1
21.	Dip slab	1
22.	Hay barn	1
23.	Watering and feeding troughs	1 set
24.	Dehorning	1 set
25.	Castration	1 set each
26.	Teeth cutting	1 set
27.	Tagging and notching	2 set
28.	Tattooing	1 set
29.	Skin and horn branding	1 set
30.	Cold storage	1
31.	Feed mixing equipment (mixer)	1

o. Others

S/N	DESCRIPTION OF ITEMS	QUANTITY REQUIRED
1.	Feed mill with accessories	1
2.	Fish pond	1
3.	Green house/screen house	1

LIST OF PARTICIPANTS DURING THE NATIONAL CURRICULUM REVIEW WORKSHOP

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