



NATIONAL BOARD FOR TECHNICAL EDUCATION

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

NATIONAL DIPLOMA

IN

ORGANIC 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

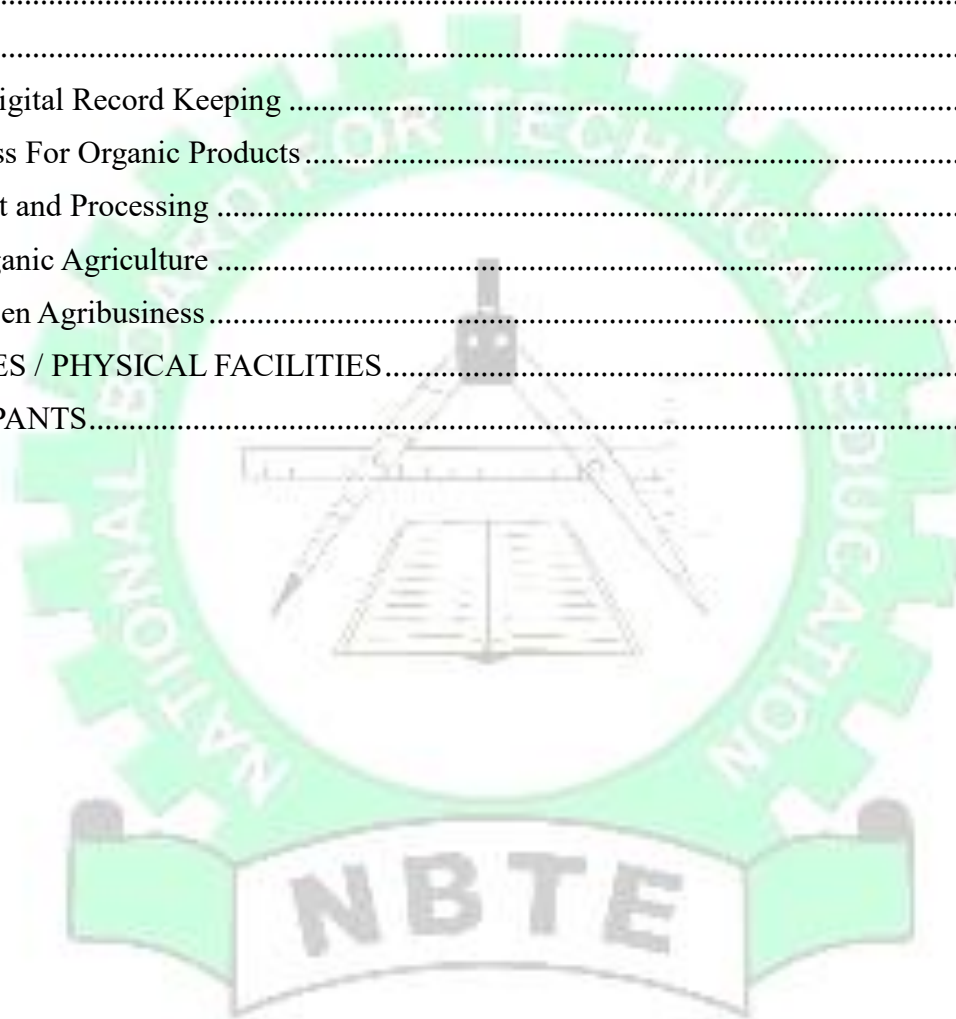
The National Board for Technical Education (NBTE) expresses its profound appreciation to all individuals and organizations whose invaluable support, expertise, and commitment made the successful review and modernization of the Agricultural Education curricula for Nigerian tertiary institutions possible. 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

National Diploma (ND) in Organic Agricultural Technology.

2.0 PROGRAMME GOAL

The National Diploma in Organic Agricultural Technology programme is designed to produce competent middle-level manpower equipped with practical skills, technical knowledge, and professional competencies for sustainable organic crop, livestock, fisheries and integrated farming systems, using climate-smart, agroecological and digitally-enabled agricultural practices, with awareness of organic certification, value chain development and agribusiness for employment and self-reliance in the Nigerian organic agricultural sector.

3.0 OBJECTIVES OF THE PROGRAMME

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

- i. Operate organic farms (crop, livestock, fisheries and integrated systems) using organic principles and climate-smart practices;
- ii. Establish and manage soil fertility in organic systems using composting, biofertilizers, cover cropping, crop rotation and organic soil health practices;
- iii. Manage pests, diseases and weeds in organic systems using integrated, biological and agroecological methods;
- iv. Apply climate-smart and regenerative agriculture practices including agroforestry, water conservation and ecosystem-based adaptation in organic farm operations;
- v. Carry out post-harvest handling, primary processing, packaging and value-addition for organic crops, livestock and fishery produce;
- vi. Assist in preparing organic farms for certification including basic documentation, record keeping and internal control systems;
- vii. Use digital agriculture tools including farm record systems, mobile apps, GPS, drones and GIS tools for organic farm management, monitoring and evaluation;
- viii. Apply basic digital marketing, e-commerce and agribusiness principles to commercialise organic agricultural products;
- ix. Develop, operate and sustain organic agricultural enterprises using business planning and sustainable supply-chain principles;
- x. Serve as extension agents transferring modern organic and agroecological practices to smallholder farmers and farmer cooperatives.

4.0 ENTRY REQUIREMENTS

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

- i. Four (4) O'Level credits in relevant subjects including Mathematics, Agricultural Science or Biology, Chemistry and one other relevant subject such as Geography, Physics or Economics. At least a pass in English Language is mandatory.
- ii. Evidence of registration with Joint Admission Matriculation Board JAMB.

5.0 STRUCTURE/DURATION OF THE PROGRAMME

The National Diploma in Organic Agricultural Technology programme is structured to last for two (2) years (four semesters) of classroom work, laboratory, field practicals and workshop practices.

Each semester shall be for 17 weeks, made up as follows:

- 15 contact weeks of teaching (i.e. lectures and practical sessions etc.); and
- 2 weeks for registration and examinations.

6.0 CURRICULUM

The syllabus of the ND Organic Agricultural Technology programme consists of four (4) main components. These are:

- a. General studies/General education courses
- b. Foundation courses
- c. Professional courses
- d. Students' Industrial Work Experience Scheme (SIWES), which shall take place in approved organic agricultural establishments, certification bodies and organic farm enterprises after the second semester of Year I for a period of 3–4 months.

7.0 STAFFING REQUIREMENTS

7.1 Core Teaching Staff

A minimum of four (4) core teaching staff who should possess at least HND or B.Sc. in Organic Agriculture, Agronomy, Animal Science, Soil Science, Agricultural Extension or related agricultural discipline. At least two (2) staff should have certification or documented training in organic agriculture from a recognised body.

7.2 Technical Staff

i. Technologist

Technologist is a senior technical staff responsible for supervising practical and laboratory activities in the department. The technologist operates, manages, and maintains laboratory and field equipment, assists lecturers during practical sessions, and supports research and field studies in wildlife and ecotourism. There has to be a relevant Technologist attached to each training facility.

ii. Technician

Technician assists in carrying out technical and practical operations within the department. The technician helps in preparing equipment and materials for practical classes, maintaining tools and facilities, and supporting students and lecturers during laboratory and field activities. There has to be a relevant Technician attached to each training facility.

iii. Field Assistant

Field Assistant supports outdoor and field operations such as conservation activities, habitat monitoring, camping exercises, and data collection. The field assistant also helps in handling field equipment and ensuring smooth coordination of field trips and excursions.

7.3 Headship of the Department (HOD)

The Head of Department shall have at least HND or First or degree and Master's degrees in Agricultural Science, Organic Agriculture or related field. He or she shall not be less than the rank of a Senior Lecturer. Training or certification in organic agriculture is an added advantage.

8.0 CERTIFICATION

A diplomate of this programme shall be awarded the National Diploma (ND) in Organic Agricultural Technology.

9.0 ACCREDITATION

The National Diploma (ND) in Organic Agricultural Technology shall be accredited by NBTE before the diplomates can be awarded the diploma certificate. Details about the process of accrediting a programme for the award of the ND are available from the Executive Secretary, National Board for Technical Education (NBTE) Plot 'B', Bida Road, P.M.B. 2239, Kaduna, Nigeria.

10.0 CONDITIONS FOR THE AWARD OF ND

10.1 Institutions offering accredited programmes will award the National Diploma to candidates who successfully complete the programme after passing prescribed coursework, examinations, diploma project and the Students' Industrial Work Experience Scheme (SIWES). Such candidates should have completed a minimum of between 72 and 80 semester credit units depending on the programme.

10.2 Grading of Courses

Courses shall be graded as follows:

MARK RANGE	LETTER GRADE	WEIGHTING
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	0.0

10.3 Classification of Diploma

Diploma Certificates shall be awarded based on the following classifications:

CGPA	CLASS OF DIPLOMA
CGPA 3.50 and above	Distinction
CGPA 3.00-3.49	Upper Credit
CGPA 2.50-2.99	Lower Credit
CGPA 2.00-2.49	Pass

11.0 GUIDANCE NOTES FOR TEACHERS OF THE PROGRAMME

11.1 The new curriculum is drawn in unit courses. This is in keeping with the provisions of the National Policy on Education which stresses 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.

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

11.3 The curriculum content has been written in behavioural objectives so that it is clear to all what the specific learning outcomes of the student who successfully completes each course are. There is a deliberate attempt to further involve the staff of the department teaching the programme by including a Teacher's Activities column to ensure that lecturers deliver the required learning objectives. A Resources column specifies the minimum materials required for each learning objective. Each department is expected to develop its own teaching plan from this minimum guide curriculum and ensure that the resources required are available.

11.4 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 this programme, the ratio of theory to practice is 20:80 in favour of practical work, reflecting the TVET and competency-based nature of the programme.

11.5 Digital tools including smartphones, mobile farm applications, GPS receivers, drone technology, free GIS software and digital farm management systems should be integrated into practical sessions wherever possible. Where physical drones are not available, institutions should use drone video footage from agricultural extension sources for analysis and interpretation exercises. Students are expected to be digitally competent upon graduation.

11.6 Farm visits, organic farm attachments and interactions with certified organic farmers, NOAN-certified farms and organic certification bodies should be organised regularly to connect students with industry realities.

12.0 PRACTICAL LOGBOOK

A practical logbook to be kept by each student shall contain all day-to-day, weekly summary and semester summary of all practical activities from day one to the end of the programme. This is to be checked, marked, endorsed and recorded by the lecturers concerned at the end of every week.

13.0 FINAL PROJECT

Final year students in this programme are expected to carry out a project work. This could be on an individual basis or group work of not more than five students per group, but reporting must be undertaken individually. The project should, as much as possible, be related to the programme and core professional discipline — preferably involving a practical organic farm enterprise, composting system, value chain analysis, organic certification documentation or digital farm management system. Project reports should be well presented and properly supervised. The department should make its own arrangement of schedules for project work.

14.0 GUIDELINES ON SIWES PROGRAMME

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

14.1 Responsibility for Placement of Students

- a. Institutions offering the ND programme shall arrange to place students in approved organic agricultural establishments, certified organic farms, organic certification bodies, agro-processing enterprises or relevant agricultural agencies. By the end of the second semester of the first academic session, six copies of the master list showing where each student has been placed shall be submitted to the Executive Secretary, NBTE, who shall in turn authenticate the list and forward it to the Industrial Training Fund, Jos.
- b. The Placement Officer should discuss and agree with industry on the following:
 - i. A task inventory of what the student is expected to experience during the period of attachment;
 - ii. The evaluation of the student by the industry-based supervisor and the institution-based supervisor;
 - iii. The final grading of the student during the period of attachment should be weighted more on the evaluation by the industry-based supervisor.

14.2 Evaluation of Student during SIWES

In the evaluation of the student, cognizance should be taken of the following items:

- i. Punctuality
- ii. Attendance
- iii. General attitude to work
- iv. Respect for authority
- v. Interest in the field/technical area
- vi. Technical competence as a potential organic agriculture technician in his/her field

14.3 Grading of SIWES

To ensure uniformity of grading scales, the institution should ensure that the uniform grading of students' work, which has been agreed to by all TVET Institutions, is adopted.

14.4 The Institution-Based Supervisor

The institution-based supervisor should sign the logbook during each visit. This will enable him/her to check and determine to what extent the objectives of the scheme are being met and to assist students having any problems regarding specific tasks given to them by their industry-based supervisor.

14.5 Frequency of Visit

Institutions should ensure that students placed on attachment are visited within one month of their placement. Other visits shall be arranged so that:

- i. There is another visit six weeks after the first visit; and

ii. A final visit in the last month of the attachment.

14.6 Stipend for Students in SIWES

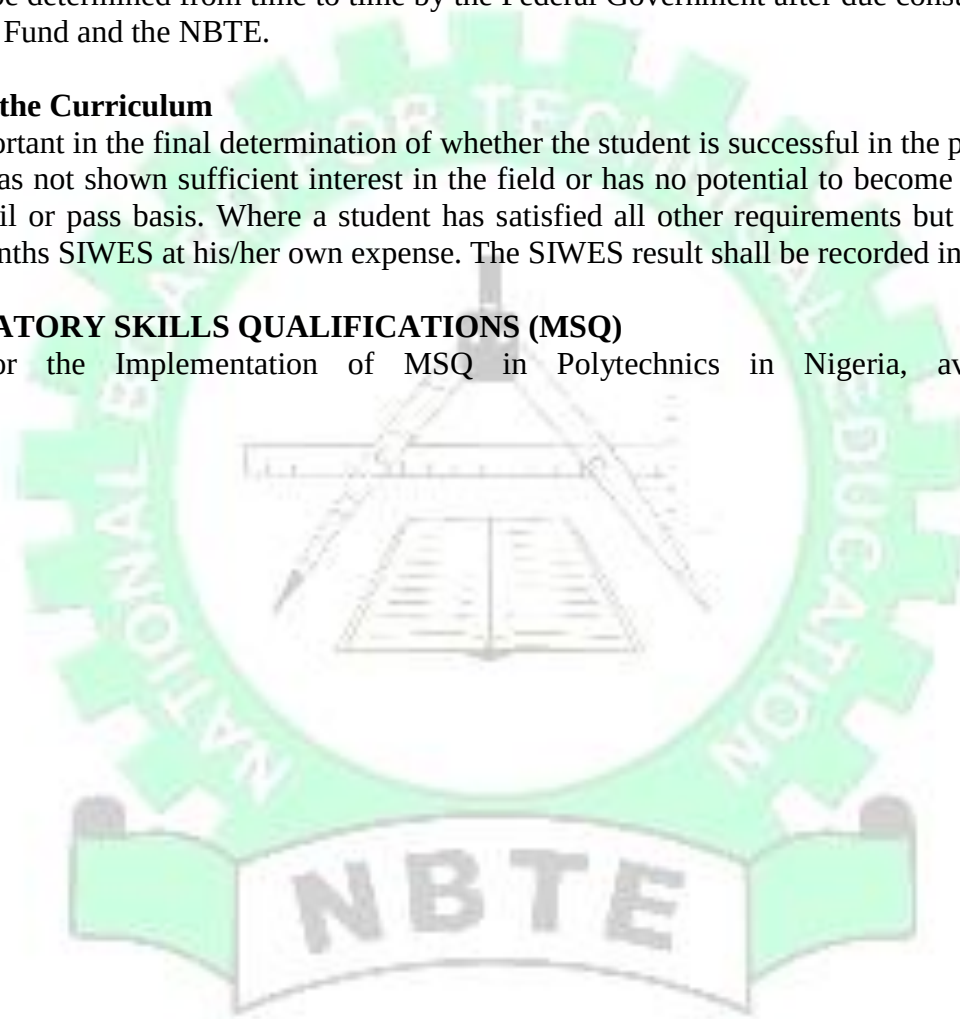
The rate of stipend payable shall be determined from time to time by the Federal Government after due consultation with the Federal Ministry of Education, the Industrial Training Fund and the NBTE.

14.7 SIWES as a Component of the Curriculum

The completion of SIWES is important in the final determination of whether the student is successful in the programme or not. Failure in SIWES is an indication that the student has not shown sufficient interest in the field or has no potential to become a skilled technician in his/her field. SIWES should be graded on a fail or pass basis. Where a student has satisfied all other requirements but failed SIWES, he/she may only be allowed to repeat another four months SIWES at his/her own expense. The SIWES result shall be recorded in the Year II Semester I result.

15.0 GUIDELINES ON MANDATORY SKILLS QUALIFICATIONS (MSQ)

Please see the Guidelines for the Implementation of MSQ in Polytechnics in Nigeria, available on the NBTE website (web.nbte.gov.ng/downloads).



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.	AGT 112	Soil Health and Digital Land Management	1	0	3	4	4
6.	AGT 114	ICT Applications in Agriculture	1	0	2	3	3
7.	OAT 111	Principles of Organic Agriculture and Agroecology	1	0	2	3	3
8.	OAT 112	Soil Fertility Management and Plant Nutrition in Organic Farming	1	0	2	3	3
9.	OAT 113	Organic Crop Production Systems	1	0	3	4	4
10.	OAT 114	Composting and Biofertilizer Production Techniques	1	0	3	4	4
11.	OAT 115	Pest and Disease Management in Organic Systems	1	0	2	3	3
12.	OAT 116	Climate-Smart and Sustainable Agriculture	1	0	2	3	3
TOTAL			15	0	22	37	37

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 125	Agro-Climatology	1	0	2	3	3
5.	OAT 121	Organic Livestock and Integrated Farming Systems	1	0	2	3	3
6.	OAT 122	Organic Beekeeping and Micro-Livestock Production	1	0	2	3	3
7.	OAT 123	Organic Horticultural Crops Production	1	0	2	3	3
8.	OAT 124	Standards and Certification in Organic Agriculture	1	0	2	3	3
9.	OAT 125	Genetics and Breeding in Organic Agriculture	1	0	2	3	3
10.	OAT 126	Water Management in Organic Farming	1	0	2	3	3
11.	OAT 127	Practical Organic Farm Operations I	0	0	4	4	4
TOTAL			13	0	19	32	32

Year II- Semester I

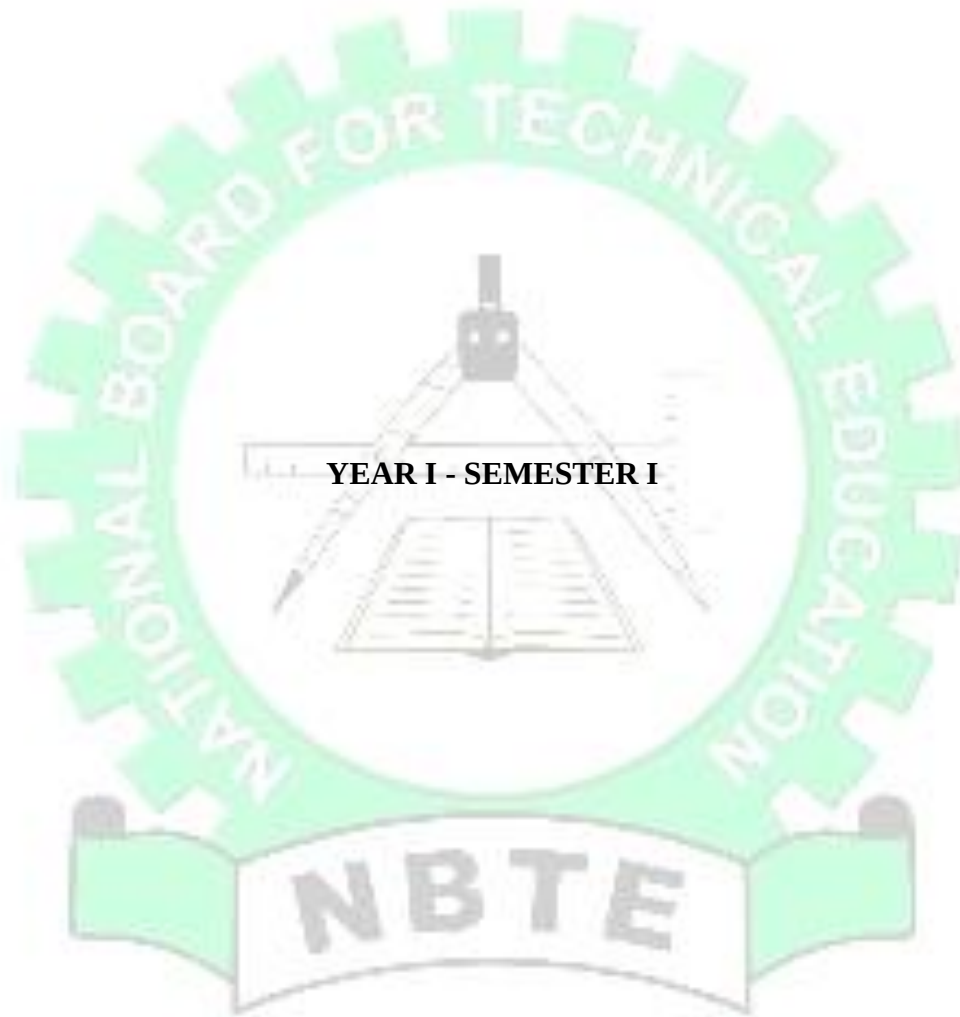
S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 201	Use of English II	2	0	0	2	2
2.	ENT 216	Introduction to Entrepreneurship II	2	0	1	3	3
3.	AGR 201	Research Methods and Experimental Design.	1	0	1	2	2
4.	AGT 215	Agricultural Mechanization and Smart Farm Systems	1	0	2	3	3
5.	OAT 211	Organic Post-Harvest Handling and Value Addition	1	0	2	3	3
6.	OAT 212	Organic Poultry Production	1	0	2	3	3
7.	OAT 213	Organic Pasture, Forage and Ruminant Production	1	0	2	3	3
8.	OAT 214	Agroforestry and Regenerative Agriculture	1	0	2	3	3
9.	OAT 215	Organic Fisheries and Aquaculture Production	1	0	2	3	3
10.	OAT 216	Student Industrial Work Experience Scheme (SIWES)	0	0	4	4	4
TOTAL			11	0	18	29	29

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 226	Agricultural Extension, Digital Advisory Systems and Rural Development	1	0	1	2	2
3.	AGT 228	Agricultural Economics and Value Chain Systems	1	0	1	2	2
4.	OAT 221	Organic Annual Crop Production	1	0	2	3	3
5.	OAT 222	Organic Farm Management and Digital Record Keeping	1	0	2	3	3
6.	OAT 223	Digital Marketing and Agribusiness for Organic Products	1	0	2	3	3
7.	OAT 224	Organic Value Chain Development and Processing	1	0	2	3	3
8.	OAT 225	Animal Health and Welfare in Organic Agriculture	1	0	2	3	3
9.	OAT 226	Organic Entrepreneurship and Green Agribusiness	1	0	2	3	3
10.	OAT 228	Project	0	0	4	4	4
TOTAL			10	0	18	28	28

KEY:

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



YEAR I - SEMESTER I

PRINCIPLES OF ORGANIC AGRICULTURE AND AGROECOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF ORGANIC AGRICULTURE AND AGROECOLOGY	COURSE CODE: OAT 111	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 provide students with the basic knowledge and skills, principles, philosophy of organic agriculture and agroecology as the foundation for all subsequent organic agricultural practices.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the meaning, principles and philosophy of organic agriculture and agroecology; 2.0 Know the history and development of organic agriculture in Nigeria and globally; 3.0 Know the benefits and challenges of organic agriculture in Nigeria; 4.0 Understand the demand for organic produce and the role of organic markets; 5.0 Know the roles of organic agriculture networks and bodies in Nigeria; 6.0 Understand standards and certification in organic agriculture; 7.0 Know agroecological practices on an organic farm; 8.0 Understand organic food systems and career pathways in organic agriculture.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: PRINCIPLES OF ORGANIC AGRICULTURE AND AGROECOLOGY	COURSE CODE: OAT 111	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 provide students with the basic knowledge and practical skills, principles, philosophy of organic agriculture and agroecology as the foundation for all subsequent organic agricultural practices.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the meaning, principles and philosophy of organic agriculture and agroecology

1 – 2	1.1 Define organic agriculture (OA). 1.2 Distinguish OA from conventional and traditional agriculture 1.3 Explain key OA terms: agroecology, buffer zone, conversion period, certification, biodiversity, etc. 1.4 State the four principles of Organic Agriculture: health, ecology, fairness and care. 1.5 Explain the elements of Agroecology: diversity, recycling,	• Explain definitions and key terms using local Nigerian farm examples • Explain the four IFOAM principles using a principles chart • Describe agroecology elements and contrast with conventional farming	Projector, marker board, IFOAM principles chart, organic vs conventional comparison chart, Nigerian Organic Agriculture Standard, video clips on organic farms, etc.	• Visit a NOAN certified organic farm and a conventional farm; compare land management, input use, crop diversity and soil cover using an observation checklist • Write a short comparison report • Identify buffer zones, compost area and organic input stores on the organic farm • Sketch a simple farm map and label each feature • Interview an organic	Guide students to: • Visit a NOAN certified organic farm and a conventional farm; compare land management, input use, crop diversity and soil cover using an observation checklist • Write a short comparison report • Identify buffer zones, compost area and organic input stores on the organic farm • Sketch a simple farm map and label each feature • Interview an organic farmer on why they	Nearby organic and conventional farms, observation checklist, farm map template, farmer interview guide, soil sampling bags, trowels, field notebooks, transport, etc.
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	synergy, efficiency, etc. 1.6 Explain the economic importance of OA to farmers, consumers and the environment.			farmer on why they practice OA Record at least five reasons and present to the class	practice OA Record at least five reasons and present to the class	
General Objective 2.0: Know the history and development of organic agriculture in Nigeria and globally						
3 – 4	2.1 Explain the historical development of OA globally from early pioneers to the modern organic movement 2.2 Explain the development of OA in Nigeria: key milestones, role of EOA Initiative and NOAN 2.3 Outline major OA movements globally 2.4 Explain the role of OA movements in promoting standards, markets and farmer support	- Discuss the historical development of OA globally from early pioneers to the modern organic movement - Discuss the development of OA in Nigeria: key milestones, role of EOA Initiative and NOAN - Explain major OA movements globally - Describe the role of OA movements in promoting standards, markets and farmer support	OA history timeline chart, IFOAM and FiBL reports, EOA Initiative Nigeria publications, NOAN materials, projector, marker board, computers with internet, etc.	- Prepare a profile of one Nigerian OA network (NOAN or EOA Nigeria): history, mission and key activities - Construct a timeline chart of OA development including at least three Nigerian milestones - Use the IFOAM website to identify any three Nigerian member organisations - Record name, location and focus area - Present the network profile to the class using a poster or slide; respond to at least two questions from peers	Guide students to: - Prepare a profile of one Nigerian OA network (NOAN or EOA Nigeria): history, mission and key activities - Construct a timeline chart of OA development including at least three Nigerian milestones - Use the IFOAM website to identify any three Nigerian member organisations; record name, location and focus area - Present the network profile to the class using a poster or slide - Respond to at least two questions from peers	Computers with internet, IFOAM website, EOA Initiative reports, NOAN publications, timeline template, poster materials, projector, etc.

General Objective 3.0: Know the benefits and challenges of organic agriculture in Nigeria

5 – 6	3.1 Explain the benefits of OA to farmers, consumers and the environment 3.2 Explain the hazards of conventional agriculture: chemical risks to soil, water and human health 3.3 Explain how OA contributes to climate change mitigation through carbon sequestration 3.4 Outline the challenges facing OA in Nigeria: low awareness, limited research, inadequate extension, weed management, etc. 3.5 Explain how these challenges can be addressed through awareness and capacity building	• Discuss benefits of OA using Nigerian case studies • Discuss hazards of conventional agriculture using photographs • Explain OA climate mitigation potential using a carbon sequestration diagram • Discuss OA challenges in Nigeria and invite students to propose solutions	OA benefits chart, conventional agriculture hazard photographs, carbon sequestration diagram, Federal Ministry of Agriculture & Food Security (FMA&FS) Organic Agriculture (OA) policy documents, projector, marker board, video clips, etc.	• Visit a conventional farm; document at least five visible environmental hazards; photograph each and prepare a short hazard report • Carry out three organic practices on the college farm: mulching, cover cropping and compost application; • Record area, materials used and estimated cost • Interview five farmers or community members on their awareness of OA; present findings as a bar chart • Prepare action plan to address one OA practice challenge in the local community	Guide students to: • Visit a conventional farm; document at least five visible environmental hazards; photograph each and prepare a short hazard report • Carry out three organic practices on the college farm: mulching, cover cropping and compost application; • Record area, materials used and estimated cost • Interview five farmers or community members on their awareness of OA; present findings as a bar chart • Prepare action plan to address one OA practice challenge in the local community	Conventional farm, hazard checklist, mulch materials, compost, cover crop seeds, college farm plots, survey template, graph paper or computers, smartphones, etc.
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General Objective 4.0: Understand the demand for organic produce and the role of organic markets

7 – 8	4.1 Explain the demand for organic produce at international, regional and national levels	• Discuss organic market demand using Research Institute of	FiBL/IFOAM World of Organic Agriculture	• Conduct a market survey • Compare prices of five different organic and	Guide students to: • Conduct a market survey • Compare prices of five different organic and	Local market, price comparison table template, smartphones with
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	4.2 Explain Nigerian organic products accessing export markets: sesame, ginger, cocoa, shea butter, etc. 4.3 Explain premium pricing and the price difference between organic and conventional products 4.4 Describe how digital platforms promote the access to organic market in Nigeria	Organic Agriculture FiBL/IFOAM market data • Discuss case studies of successful Nigerian organic exports • Explain premium price using current market prices • Discuss digital marketing platforms: WhatsApp Business, online organic stores, etc.	report, organic export case study materials, current market price data, projector, marker board, computers with internet, etc.	conventional products. • Calculate the premium price percentage for each product. • Visit three different online platforms selling organic products in Nigeria • Record products, prices and how farmers connect with buyers • Prepare market brief for any one Nigerian organic product showing domestic and export prices and estimated farmer income • Set up a simple WhatsApp Business catalogue for one college farm product • Add product name, price, photograph and contact.	conventional products. • Calculate the premium price percentage for each product. • Visit three different online platforms selling organic products in Nigeria • Record products, prices and how farmers connect with buyers • Prepare market brief for any one Nigerian organic product showing domestic and export prices and estimated farmer income • Set up a simple WhatsApp Business catalogue for one college farm product • Add product name, price, photograph and contact.	internet, WhatsApp Business app, FiBL market data, market brief template, transport, etc.
General Objective 5.0: Know the roles of organic agriculture networks and bodies in Nigeria						
9 – 10	5.1 Describe OA networks operating in Nigeria: NOAN, EOA Initiative, OAPTIN, etc. 5.2 Explain the roles of	• Discuss the profile of each OA network using charts and published materials	NOAN and EOA Initiative profile materials, OA networks chart, FMA&FS OA	• Build a directory of at least five OA networks in Nigeria: name, focus area, contact and website for each • Invite or virtually	Guide students to: • Build a directory of at least five OA networks in Nigeria: name, focus area, contact and website for each	OA network directory template, computers with internet, Nigeria map, smartphones with GPS apps,

	OA networks: awareness, capacity building, market linkage, certification support, etc. 5.3 Describe how OA networks support smallholder farmers: training, market access, input supply, etc. 5.4 Explain the role of government bodies in OA development: FMA&FS and State Ministries of Agriculture	• Discuss roles of each network with documented examples from Nigeria • Explain how government bodies support OA development	policy documents, projector, marker board, computers with internet, etc.	connect with a NOAN or EOA Initiative representative; record key support services offered to organic farmers and present a summary • Identify one government programme supporting organic farming practices and prepare fact sheets on the programme • Map OA network locations on a Nigeria map using coordinates from their websites	• Invite or virtually connect with a NOAN or EOA Initiative representative; record key support services offered to organic farmers and present a summary • Identify one government programme supporting organic farming practices and prepare fact sheets on the programme • Map OA network locations on a Nigeria map using coordinates from their websites	video, fact sheet template, etc.
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General Objective 6.0: Know agroecological practices on an organic farm

11 – 13	6.1 Explain agroecology as a science and a farming practice 6.2 Describe how agroecological practices increase farm biodiversity e.g polycultures, hedgerows, on-farm tree planting, etc. 6.3 Explain ecological pest suppression	• Discuss agroecology practices using simple practical examples from Nigerian farms • Describe biodiversity-building practices with photographs • Explain ecological pest suppression using	Agroecological practice photographs, natural enemy habitat diagram, Nigerian farm case studies, projector, marker board, video, computers, etc.	• Conduct a biodiversity count on the college farm: record number of crop species, tree species and beneficial insects observed on a plot • Establish a habitat strip of at least 5 metres along a college farm plot using flowering plants and grasses; record species planted	Guide students to: • Conduct a biodiversity count on the college farm: record number of crop species, tree species and beneficial insects observed on a plot • Establish a habitat strip of at least 5 metres along a college farm plot using flowering plants and grasses; record species planted and purpose	Biodiversity recording form, flowering plant and grass seeds, measuring tape, polyculture design template, college farm plots, field notebooks, smartphones, etc.
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	through habitat diversity and natural enemies 6.4 Explain how agroecology supports climate change adaptation and soil restoration	a natural enemy habitat diagram • Discuss agroecology and climate adaptation with Nigerian case studies		and purpose • Design a polyculture plot for a 20m x 20m area: specify at least four crop species, their arrangement and the ecological benefit of each combination • Prepare agroecological assessment of the college farm identifying three strengths and three areas for improvement.	• Design a polyculture plot for a 20m x 20m area: specify at least four crop species, their arrangement and the ecological benefit of each combination • Prepare agroecological assessment of the college farm identifying three strengths and three areas for improvement.	
General Objective 7.0: Understand organic food systems and career pathways in organic agriculture						
14 - 15	7.1 Explain the organic food system from soil to consumer plate 7.2 Describe the organic value chain in Nigeria: production, processing, certification, marketing, etc. 7.3 Identify career pathways for ND OAT graduates: farm technician, extension agent, input dealer, certification assistant, agripreneurs, etc.	• Explain the organic food system using a farm-to-plate diagram • Describe the Nigerian organic value chain with local product examples • Describe career pathways with real examples of OA graduates in Nigeria • Discuss competencies and	Organic food system diagram, Nigerian organic value chain diagram, career pathway chart, projector, marker board, video, guest speaker if available, etc.	• Map the value chain for one Nigerian organic product: draw all actors from input supplier to consumer and record the value added at each stage • Interview one OA professional: record their career path, daily responsibilities and advice for new graduates and present findings to the class • Prepare a personal career plan: choose one OA career pathway, list skills to develop during	Guide students to: • Map the value chain for one Nigerian organic product: draw all actors from input supplier to consumer and record the value added at each stage • Interview one OA professional: record their career path, daily responsibilities and advice for new graduates and present findings to the class • Prepare a personal career plan: choose one OA career pathway, list skills	Value chain mapping template, professional interview guide, career plan template, smartphones or computers with internet, guest speaker contact details, etc.

	7.4 Explain the competencies needed for a successful career in organic agriculture in Nigeria	professional qualities required for OA careers		the ND programme and identify one professional network to join • Research any three OA job opportunities currently available in Nigeria • Record job title, employer, qualifications required and how to apply	to develop during the ND programme and identify one professional network to join • Research any three OA job opportunities currently available in Nigeria • Record job title, employer, qualifications required and how to apply	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**COURSE TITLE:** SOIL FERTILITY MANAGEMENT AND PLANT NUTRITION IN ORGANIC FARMING**COURSE CODE:** OAT 112**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 practical skills to assess, manage and improve soil fertility in organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand soil, properties and its characterisation;
- 2.0 Understand the concepts of plant nutrition;
- 3.0 Understand soil organic matter and its role in soil fertility;
- 4.0 Know the types, preparation and application of organic fertilizers;
- 5.0 Understand soil conservation and erosion control in organic farming;
- 6.0 Know soil sampling and fertility assessment methods on organic farms;
- 7.0 Know a soil fertility management plan for an organic farm;
- 8.0 Understand cover cropping, green manuring and crop rotation in soil fertility management.

SOIL FERTILITY MANAGEMENT AND PLANT NUTRITION IN ORGANIC FARMING

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: SOIL FERTILITY MANAGEMENT IN ORGANIC FARMING			COURSE CODE: OAT 112		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 practical skills to assess, manage and improve soil fertility in organic farming systems.						
	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand soil, properties and its characterisation						
1 – 2	1.1 Define soil 1.2 Explain soil importance to organic crop production 1.3 Describe the physical properties of soil: texture, structure, colour, porosity, water-holding capacity, etc. 1.4 Explain soil chemical properties: pH and nutrient availability 1.5 Describe soil	• Explain soil and the importance using a soil profile diagram • Describe physical properties using soil sample demonstrations • Explain chemical properties and relate them to organic crop nutrition • Describe	Soil profile diagram, soil texture triangle, soil food web diagram, soil samples, pH meter or test strips, projector, videos, marker board, etc.	• Collect soil samples from three different locations on the college farm measuring pH, texture and colour for each and record results in a table form • Dig a soil profile of at least 1 metre on the college farm • Sketch each horizon measuring depth of each layer. • Compare earthworm counts from an organically managed and a	Guide students to: • Collect soil samples from three different locations on the college farm measuring pH, texture and colour for each and record results in a table form • Dig a soil profile of at least 1 metre on the college farm • Sketch each horizon measuring depth of each	pH meter or test strips, soil auger, trowels, spades, measuring tape/tools, GPS smartphone app, farm sketch map template, field notebooks, PPE, etc.

	biological properties: soil organisms and their roles in nutrient cycling 1.6 Explain the soil profile and the characteristics of each horizon	biological properties using a soil food web diagram		conventionally managed plot. - Record and discuss the difference - Use a GPS smartphone app to record the coordinates of sampling points and plot using appropriate app	layer - Compare earthworm counts from an organically managed and a conventionally managed plot - Record and discuss the difference - Use a GPS smartphone app to record the coordinates of sampling points and plot using appropriate app	
General Objective 2.0: Understand the concept of plant nutrition						
3-4	2.1 Define plant nutrients 2.2 Explain sources of plant nutrients in the soil 2.3 Explain the losses of plant nutrients from the soil; runoff, erosion, etc 2.4 Explain essential nutrients 2.5 State the condition for essentiality of plant nutrients 2.6 Explain the classification of all the essential elements on the basis of quantity required by plants 2.7 Describe the forms of	- Discuss the concept of plant nutrition - Explain sources and losses of plant nutrients in the soil - Discuss the concept of essential nutrients - Explain the forms of availability, functions and deficiency symptoms of the essential plant nutrients - Discuss the factors that affect crop	White board, markers, projector, laptop, videos, Soil nutrient map, Pictures of well-nourished plants, Pictures of malnourished plants, etc	- Visit the College farm to identify and document the evidences of factors causing nutrient losses. - Identify well nourished and poorly nourished plants in the field and record the observation. - Examine plants exhibiting nutrient deficiencies and record the symptoms - Demonstrate the importance of plant nutrients for crop production using a simple pot experiment	Guide students to: - Visit the College farm to identify and document the evidences of factors causing nutrient losses. - Identify well nourished and poorly nourished plants in the field and record the observation. - Examine plants exhibiting nutrient deficiencies and record the symptoms - Demonstrate the importance of plant nutrients for crop production using a simple pot experiment	College farm or nearby farm, mobile soil test kit/equipment, Plant samples, hand lenses, field notebooks, smartphone, virtual lab, transport, PPE, etc.

	availability, functions and deficiency symptoms of the essential plant nutrients	nutrition.				
	2.8 Outline the factors that affect crop nutrition, soil reaction, crop removal, soil texture, etc					
General Objective 3.0: Understand soil organic matter and its role in soil fertility						
5–6	3.1 Define soil organic matter (SOM) 3.2 Explain soil organic matter (SOM) and its components 3.3 Explain the role of SOM in soil fertility: nutrient supply, water retention and biological activity 3.4 Explain the decomposition process and the importance of the Carbon Nitrogen (C:N) ratio 3.5 Describe practices that build SOM: composting, green manuring, cover cropping, mulching and minimum tillage 3.6 Explain how SOM	• Define SOM and explain its components using a decomposition diagram • Discuss SOM roles in soil fertility using field data from Nigerian organic farms • Explain the C:N ratio with examples of high and low C:N materials • Describe SOM-building practices and demonstrate on the college farm where possible	Decomposition process diagram, C:N ratio table, SOM role diagram, organic farm research data, projector, video, marker board, etc.	• Collect organic materials from the college farm. • Calculate the C:N ratio of a proposed compost blend using the C:N ratio table • Adjust the blend to achieve 25–30:1 • Observe a compost pile over two weekly visits. • Record temperature, colour, smell and moisture at each visit and compare observations • Establish a mulched and an un-mulched plot. • Measure and compare soil temperature and moisture after one week and complete the results. • Plant cowpea or mucuna as a green manure on a small	Guide student to: • Collect organic materials from the college farm. • Calculate the C:N ratio of a proposed compost blend using the C:N ratio table • Adjust the blend to achieve 25–30:1 • Observe a compost pile over two weekly visits. • Record temperature, colour, smell and moisture at each visit and compare observations • Establish a mulched and an un-mulched plot. • Measure and compare soil temperature and moisture after one week	C:N ratio table, weighing scale, organic materials, existing compost pile, thermometer, moisture meter, mulch materials, green manure seeds, college farm plots, etc.

	contributes to carbon sequestration and climate change mitigation			plot. Record germination and growth before incorporation	and complete the results. - Plant cowpea or mucuna as a green manure on a small plot. - Record germination and growth before incorporation	
General Objective 4.0: Know the types, preparation and application of organic fertilizers						
7-8	4.1 Define organic fertilizer. 4.2 Distinguish organic fertilizer from synthetic fertilizer 4.3 Explain the classification of organic fertilizers: farmyard manure, poultry manure, compost, vermicompost, green manure, biofertilizers, etc. 4.4 Describe the nutrient content, preparation and application of each type of organic fertilizers. 4.5 Explain biofertilizers: types, mechanism of action and applications. 4.6 Describe the allowed	- Classify organic fertilizers using a display of available samples - Describe nutrient content of each type using a nutrient content table - Explain biofertilizers using a nitrogen fixation diagram - Describe the allowed and prohibited inputs using the Nigerian Organic Agriculture Standard	Organic fertilizer samples, nutrient content table, N-fixation diagram, Nigerian Organic Agriculture Standard, compost tea preparation guide, projector, videos, marker board, etc.	- Classify organic fertilizers using a display of available samples - Identify nutrient content of each type using a nutrient content table - Create a poster to explain biofertilizers using a nitrogen fixation diagram - Identify the allowed and prohibited inputs using the Nigerian Organic Agriculture Standard	Guide students to: - Classify organic fertilizers using a display of available samples - Identify nutrient content of each type using a nutrient content table - Create a poster explain biofertilizers using a nitrogen fixation diagram - Identify the allowed and prohibited inputs using the Nigerian Organic Agriculture Standard	Organic fertilizer samples, compost materials, thermometer, compost tea containers, Rhizobium inoculant, legume seeds, weighing scale, college farm plots, PPE, etc.

	and prohibited soil fertility management inputs in certified organic systems.					
General Objective 5.0: Understand soil conservation and erosion control in organic farming						
9-10	5.1 Define soil erosion. 5.2 Explain soil erosion types: sheet, rill, gully and wind erosion 5.3 Explain the causes and effects of soil erosion on organic farm productivity 5.4 Describe organic soil conservation practices: contour farming, mulching, cover cropping, minimum tillage, etc. 5.5 Describe water conservation practices: tied ridges, Zai pits, rainwater harvesting, etc. 5.6 Explain climate change effects on soil erosion in Nigerian ecological zones	• Explain erosion types using photographs and diagrams • Discuss causes and effects of erosion on soil fertility • Describe conservation practices using field diagrams • Explain water conservation structures using construction diagrams	Erosion type photographs, conservation practice diagrams, water harvesting structure diagrams, Nigeria ecological zone map, projector, marker board, video clips, etc.	• Identify at least four signs of erosion on or near the college farm. • Take the photograph of each type and classify them by type • Construct a contour ridge of at least 10 metres on a sloped plot using a hand level and record construction steps • Apply mulch to a 2m x 4m plot. • Compare weed density and soil moisture with an un-mulched control after two weeks • Use drone or drone footage to identify erosion-prone areas on the farm. • Annotate a farm map with hotspots and recommend one conservation measure for each	Guide students to: • Identify at least four signs of erosion on or near the college farm • Take the photograph of each and classify by type • Construct a contour ridge of at least 10 metres on a sloped plot using a hand level and record construction steps • Apply mulch to a 2m x 4m plot • Compare weed density and soil moisture with an un-mulched control after two weeks • Use drone or drone footage to identify erosion-prone areas on the farm • Annotate a farm map with hotspots and recommend one conservation measure for each	Erosion observation checklist, hand level or water-bottle level, hoes, pegs, mulch materials, moisture meter, drone or drone footage, farm sketch map template, measuring tape/tools, etc.

General Objective 6.0: Undertand soil sampling and fertility assessment methods on organic farms

11-12	6.1 Explain the importance of soil testing in organic farm management 6.2 Describe soil sampling methods: composite sampling and sampling depth 6.3 Explain soil fertility test parameters: pH, nitrogen, phosphorus, etc. 6.4 Describe field-based fertility assessment: soil colour, earthworm count, compaction test, etc. 6.5 Explain how to interpret soil test results and recommend organic amendments	• Explain soil testing importance using a sampling protocol diagram • Describe test parameters and relate each to organic crop production • Explain field-based assessment methods with farm demonstrations	Soil sampling protocol diagram, sample soil test results, field soil test kit, field assessment guide, GPS smartphone app, projector, videos, marker board, etc.	• Collect composite soil samples from three farm plots. • Prepare composite soil samples collected for testing and label them • Test soil pH and phosphorus from collected samples using a field test kit. • Record results between plots and compare them • Carry out a field fertility assessment on two plots: compaction test, earthworm count and crop colour observation and record all results • Interpret sample soil test results provided by the lecturer and write a short fertility management recommendation • Create a simple soil sampling map of the college farm using GPS on a smartphone • Mark sampling points and label with pH values	Guide students to: • Collect composite soil samples from three farm plots; • Prepare composite soil samples collected for testing • Test soil pH and phosphorus from collected samples using a field test kit; • Record and compare results between plots • Carry out a field fertility assessment on two plots: compaction test, earthworm count and crop colour observation and record all results • Interpret sample soil test results provided by the lecturer and write a short fertility management recommendation • Create a simple soil sampling map of the college farm using GPS on a smartphone • Mark sampling points and label with pH values	Soil auger, sampling bags, field soil test kit, penetrometer or steel rod, GPS smartphone app, sample soil test results, fertility recommendation template, field notebooks, PPE, etc.
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General Objective 7.0: Understand soil fertility management plan for an organic farm

13-14	7.1 Explain the components of a soil fertility management plan: baseline, amendment schedule, rotation, monitoring, etc. 7.2 Describe how to integrate composting, cover cropping and biofertilizers into a farm fertility strategy 7.3 Explain how to record soil fertility activities for organic certification 7.4 Describe how to use Google Sheets or a farm app to plan and record soil management activities	• Explain sample soil fertility management plan document • Explain integration of multiple fertility practices into an annual plan • Describe record-keeping requirements for organic certification • Describe Google Sheets for recording soil management activities	Sample soil fertility management plan, crop rotation diagram, certification record-keeping guidelines, smartphone or computer with Google Sheets, projector, videos, marker board, etc.	• Prepare a one-year soil fertility management plan for a 2-hectare organic farm: include amendment type and rate, crop rotation, green manure calendar and monitoring schedule • Record all soil fertility activities carried out on the college farm during the semester in a farm logbook • Enter one month of soil management activities into Google Sheets • Export as PDF and present to the class • Review a peer student's fertility plan using a checklist and provide at least two specific comments	Guide students to: • Prepare a one-year soil fertility management plan for a 2-hectare organic farm: include amendment type and rate, crop rotation, green manure calendar and monitoring schedule • Record all soil fertility activities carried out on the college farm during the semester in a farm logbook; submit at the end of semester • Enter one month of soil management activities into Google Sheets • Export as PDF and present to the class • Review a peer student's fertility plan using a checklist and provide at least two specific comments	Soil fertility plan template, farm logbook template, smartphones or computers with Google Sheets, peer review checklist, crop rotation chart, etc.
General Objective 8.0: Understand cover cropping, green manuring and crop rotation in soil fertility management						
15	8.1 Explain the roles of cover crops in organic soil fertility: nitrogen fixation, weed suppression, erosion control, etc.	• Explain cover crop roles using a soil benefit diagram • Describe Nigerian cover crop species with nutrient	Cover crop species photographs, nutrient contribution data, four-field	• Establish two cover crop plots using different species • Record germination, canopy cover at week 2 and estimated biomass at week 4	Guide students to: • Establish two cover crop plots using different species • Record germination, canopy cover at week 2	Cover crop seeds, weighing scale, soil sampling bags, rotation design template, farmer

	8.2 List common cover crop species used in Nigeria and their soil benefits: cowpea, mucuna, lablab, sunn hemp, etc. 8.3 Explain green manuring: crop selection, timing of incorporation, nitrogen contribution, etc. 8.4 Describe the principles of crop rotation in organic farming: sequencing legumes, cereals, root crops, etc. 8.5 Explain how cover crops, green manures and crop rotation work together as an integrated fertility strategy	contribution data • Explain green manuring with farm demonstration where possible • Describe crop rotation principles using a four-field rotation diagram	rotation diagram, green manuring guide, cover crop seeds, projector, videos, marker board, etc.	• Incorporate an earlier-planted green manure crop into a soil plot • Weigh above-ground biomass before incorporation • Compare earthworm count with an unincorporated control plot after 2 weeks • Design a four-year crop rotation for a 2-hectare organic farm including at least one legume, one cereal and one root crop • Present as a rotation diagram • Interview five local farmers on whether they use cover crops or rotation • Record their practices and challenges • Present findings as a summary table	and estimated biomass at week 4 • Incorporate an earlier-planted green manure crop into a soil plot • Weigh above-ground biomass before incorporation; compare earthworm count with an unincorporated control plot after 2 weeks • Design a four-year crop rotation for a 2-hectare organic farm including at least one legume, one cereal and one root crop • Present as a rotation diagram • Interview five local farmers on whether they use cover crops or rotation • Record their practices and challenges; present findings as a summary table	survey form, college farm plots, measuring tape, field notebooks, PPE, etc.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ORGANIC CROP PRODUCTION SYSTEMS

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ORGANIC CROP PRODUCTION SYSTEMS	COURSE CODE: OAT 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 the knowledge and practical skills to establish, manage and harvest crops in organic production systems.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the scope and importance of organic crop production in Nigeria; 2.0 Know cropping systems used in organic agriculture; 3.0 Understand land and seedbed preparation in organic crop production; 4.0 Understand plant propagation in organic crop production; 5.0 Understand weed management in organic crop production; 6.0 Know organic soil fertility practices in crop production; 7.0 Know organic crop protection practices in the field; 8.0 Understand harvesting, storage and handling of organic produce.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC CROP PRODUCTION SYSTEMS	COURSE CODE: OAT 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 the knowledge and practical skills to establish, manage and harvest crops in organic production systems.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand the scope and importance of organic crop production in Nigeria						
1	1.1 Define organic crop production 1.2 Explain its scope in Nigeria 1.3 Explain the importance of organic crop production: food safety, environmental benefit and export potentials 1.4 State the factors affecting organic crop production: climate, soil, market and certification 1.5 Outline major organic crops produced in Nigeria	• Explain scope and importance using Nigerian production data • Discuss factors affecting OA crop production with zone map • Outline major organic crops by zone using a Nigeria agro-ecological zone map	Nigeria agro-ecological zone map, organic crop production data, organic crop photographs, projector, marker board, video clips, etc.	• Identify ten major organic crops from samples or photographs • Record crop name, ecological zone, market value and one production challenge for each • Conduct a rapid market survey • Identify organic products sold, record prices and compare with conventional equivalents • Photograph three organic crops on the	Guide students to: • Identify ten major organic crops from samples or photographs • Record crop name, ecological zone, market value and one production challenge for each • Conduct a rapid market survey • Identify organic products sold, record prices and compare with conventional equivalents • Photograph three	Organic crop samples or photo cards, Nigeria agro-ecological zone map, market survey form, smartphones, identification card template, college farm, transport, PPE etc.

	by ecological zone			college farm; prepare a labelled identification card for each	organic crops on the college farm • Prepare a labelled identification card for each	
General Objective 2.0: Know cropping systems used in organic agriculture						
2 – 3	2.1 Define cropping systems 2.2 Explain cropping systems: monocropping, mixed cropping, intercropping, relay cropping, crop rotation and agroforestry 2.3 State the advantages and disadvantages of each system for organic production 2.4 Explain how to select the most appropriate cropping system for a given farm 2.5 Explain the role of crop diversity in pest management and soil fertility restoration in organic systems	• Explain each cropping system with diagrams and Nigerian farm examples • Discuss advantages and disadvantages in the organic farming context • Explain crop diversity benefits with Nigerian organic farm examples	Cropping system diagrams, Nigerian organic farm case studies, cropping system decision chart, projector, video, marker board, etc.	• Map three cropping systems on the college farm or nearby farm • Sketch each and record advantages observed • Establish a maize-cowpea intercrop plot on the college farm • Record planting date, spacing and germination after 7 days • Design a three-year crop rotation for a 2-hectare organic farm • Present as a diagram with justification for each crop sequence • Use drone or drone footage to observe a farm's cropping arrangement from above; sketch the	Guide students to: • Map three cropping systems on the college farm or nearby farm; sketch each and record advantages observed • Establish a maize-cowpea intercrop plot on the college farm; record planting date, spacing and germination after 7 days • Design a three-year crop rotation for a 2-hectare organic farm; present as a diagram with justification for each crop sequence • Use drone or drone footage to observe a farm's cropping arrangement from	College farm or nearby farm, sketch map template, maize and cowpea seeds, measuring tape/tools, pegs, rotation planning template, drone or drone footage, transport, smartphones, PPE, field notebooks, etc.

				pattern and identify the system type	above; sketch the pattern and identify the system type	
General Objective 3.0: Understand land and seedbed preparation in organic crop production						
4 – 5	3.1 Define land preparation 3.2 Explain land preparation objectives in organic crop production 3.3 Describe land preparation methods allowed in organic systems: manual, animal traction and minimum tillage 3.4 Explain prohibited land preparation practices in certified organic systems 3.5 Describe seedbed preparation for different organic crops 3.6 Explain minimum tillage and zero tillage and their benefits for soil health	• Explain land preparation objectives and organic methods with farm examples • Describe prohibited practices and explain why they are excluded from certified organic systems • Explain seedbed types with their preparation's demonstration on the farm • Explain minimum and zero tillage using soil disturbance diagrams	Land preparation method diagrams, tool display, Nigerian Organic Agriculture Standard, minimum and zero tillage diagrams, projector, video, marker board, etc.	• Prepare a 10m x 10m plot using minimum tillage • Compare soil disturbance and surface cover with a conventionally tilled plot • Record observations • Demonstrate correct use of five land preparation tools • Record the purpose and safety rule for each • Prepare a raised seedbed of 1m x 5m: loosen soil to 15cm, incorporate compost, level and create drainage channels • Measure the area of a prepared plot using a GPS smartphone app and tape measure • Compare both results	Guide students to: • Prepare a 10m x 10m plot using minimum tillage; compare soil disturbance and surface cover with a conventionally tilled plot; record observations • Demonstrate correct use of five land preparation tools; record the purpose and safety rule for each • Prepare a raised seedbed of 1m x 5m: loosen soil to 15cm, incorporate compost, level and create drainage channels • Measure the area of a prepared plot using a GPS smartphone app and tape measure; compare both results	College farm plots, land preparation tools, compost, measuring tape/tools, pegs, GPS smartphone app, PPE: gloves and boots, etc.
General Objective 4.0: Understand plant propagation in organic crop production						

6 – 7	4.1 Define plant propagation 4.2 Distinguish sexual and asexual propagation 4.3 Explain seed germination and the factors affecting it in organic systems 4.4 Describe asexual propagation methods: cuttings, suckers, tubers, budding and grafting 4.5 Explain organic seed requirements: use of certified organic seed and prohibited seed treatments 4.6 Describe nursery management in organic systems: growing media, watering, shading and transplanting	• Define propagation and distinguish between methods with Nigerian crop examples • Explain germination and factors affecting it using a germination diagram • Demonstrate asexual propagation on the college farm where possible • Explain organic seed requirements using the Nigerian Organic Agriculture Standard • Describe organic nursery management with photographs of established nurseries	Germination diagram, propagation specimens, Nigerian Organic Agriculture Standard, nursery management guide, nursery equipment display, projector, video, marker board, etc.	• Carry out a germination test on three seed lots using wet cloth • Record germination percentage after 7 days and assess seed quality • Demonstrate three asexual propagation methods on the college farm: stem cutting, sucker separation and grafting or budding • Record method, date and success rate • Set up and manage an organic nursery of 20 seedlings • Water daily and record growth weekly for four weeks • Plant seeds of three vegetable crops using three methods: broadcasting, dibbling and row drilling; record germination and plant stand after 10 days	Guide students to: • Carry out a germination test on three seed lots using wet cloth; record germination percentage after 7 days and assess seed quality • Demonstrate three asexual propagation methods on the college farm: stem cutting, sucker separation and grafting or budding; record method, date and success rate • Set up and manage an organic nursery of 20 seedlings; water daily and record growth weekly for four weeks • Plant seeds of three vegetable crops using three methods: broadcasting, dibbling and row drilling; record germination and plant stand after 10 days	Seed lots, germination paper or wet cloth, propagation materials, grafting knife, nursery trays, organic growing media, vegetable seeds, college farm plots, smartphones, PPE, watering cans, etc.
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General Objective 5.0: Understand weed management in organic crop production

8 – 9	5.1 Define weed 5.2 Explain weed classification by life cycle and morphology 5.3 Explain the effects of weeds on organic crops: competition, pest harbouring, etc. 5.4 Describe organic weed management methods: manual weeding, mulching, cover cropping, crop rotation, etc. 5.5 Describe allowable and prohibited weed control methods in certified organic systems	• Define and classify weeds using specimens or photographs • Explain weed competition effects using yield loss data • Describe organic weed management methods with practical demonstrations • Discuss allowed and prohibited weed control methods using the Nigerian Organic Agriculture Standard	Weed specimens or photographs, weed classification chart, organic weed management diagrams, Nigerian Organic Agriculture Standard, projector, video marker board, etc.	• Collect 20 weed specimens from the college farm; classify each by life cycle and morphology • Carry out weeding on a 4m x 4m plot; record weed species, density per m², time taken and fresh weight of weed removed • Apply mulch at 10cm depth to a 2m x 4m plot • Compare weed density with an unmulched control after two weeks • Use drone or drone footage to assess weed pressure across a crop field • Identify dense weed patches on a farm map and recommend one organic control for each	Guide students to: • Collect 20 weed specimens from the college farm; classify each by life cycle and morphology • Carry out weeding on a 4m x 4m plot; record weed species, density per m², time taken and fresh weight of weed removed • Apply mulch at 10cm depth to a 2m x 4m plot • Compare weed density with an unmulched control after two weeks • Use drone or drone footage to assess weed pressure across a crop field • Identify dense weed patches on a farm map and recommend one organic control for each	College farm with diverse weeds, collection bags, camera, weed identification guide, weighing scale, mulch materials, drone or drone footage, farm sketch map, smartphones, PPE, etc.
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General Objective 6.0: Know organic soil fertility practices in crop production

10-11	6.1 Explain the objectives of soil fertility management in organic crop production 6.2 Describe methods of maintaining soil fertility: crop rotation, cover cropping, composting and biofertilizers 6.3 Explain preparation and application of compost and farmyard manure in crop production 6.4 Explain the timing and rate of organic fertilizer application for different crops 6.5 Describe how to calculate and apply the correct organic fertilizer quantity for a given plot	• Explain soil fertility management objectives with farm examples • Describe each method and demonstrate relevant ones on the college farm • Explain compost and manure application rates with examples • Describe fertilizer rate calculation for example crops and plot sizes	Fertilizer rate calculation table, compost preparation guide, crop rotation diagram, college farm plots, projector, video, marker board, etc.	• Calculate compost required for a 4m x 4m plot at 10 t/ha • Weigh and apply to the plot • Record application method and date • Apply compost to one plot and farmyard manure to a second plot at the same rate • Monitor and record plant height and leaf colour weekly for four weeks • Plant a green manure crop on a 2m x 4m plot • Record germination and growth; incorporate into soil and record date and method • Prepare a seasonal fertility management schedule for a maize or cassava crop covering planting to three months of growth	Guide students to: • Calculate compost required for a 4m x 4m plot at 10 t/ha • Weigh and apply to the plot • Record application method and date • Apply compost to one plot and farmyard manure to a second plot at the same rate • Monitor and record plant height and leaf colour weekly for four weeks • Plant a green manure crop on a 2m x 4m plot • Record germination and growth; incorporate into soil and record date and method • Prepare a seasonal fertility management schedule for a maize or cassava crop covering planting to three months of growth	Compost, farmyard manure, weighing scale, measuring containers, green manure seeds, college farm plots, measuring tape, crop monitoring sheet, fertility management schedule template, smartphones, PPE, etc.
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General Objective 7.0: Know organic crop protection practices in the field

12-13	7.1 Explain the importance of crop protection in organic agriculture 7.2 List allowed crop protection methods in certified organic systems 7.3 Describe integrated pest management (IPM) in organic crop production and the IPM decision ladder 7.4 Explain the preparation and application of botanical pesticides: neem, chilli and wood ash 7.5 Describe PPE requirements for applying organic crop protection materials	• Explain crop protection importance and list all allowed methods • Describe IPM using the pest management decision ladder • Describe botanical pesticide preparation • Explain and demonstrate correct PPE use before any spray application	IPM decision ladder chart, botanical pesticide preparation guide, PPE display, Nigerian Organic Agriculture Standard, knapsack sprayer, projector, marker board, etc.	• Prepare three botanical pesticides: neem extract, chilli spray and wood ash suspension • Record preparation method, concentration and target pest for each • Calibrate a knapsack sprayer and apply a botanical pesticide to an infested plot • Record application details and count pest numbers before and 7 days after application • Identify ten crop pests and diseases on the college farm • Photograph each and record crop affected, damage symptoms and one organic control measure • Demonstrate correct PPE donning and doffing • Record each PPE item used and its	Guide students to: • Prepare three botanical pesticides: neem extract, chilli spray and wood ash suspension • Record preparation method, concentration and target pest for each • Calibrate a knapsack sprayer and apply a botanical pesticide to an infested plot • Record application details and count pest numbers before and 7 days after application • Identify ten crop pests and diseases on the college farm • Photograph each and record crop affected, damage symptoms and one organic control measure • Demonstrate correct PPE donning and doffing • Record each PPE	Neem leaves, chilli pepper, wood ash, extraction containers, calibrated knapsack sprayer, PPE, pest identification guide, smartphones, drone or drone footage, farm sketch map, etc.
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				function • Use drone or drone footage to scout for pest damage patterns across a crop field • Identify affected zones on a farm map and recommend organic interventions	item used and its function • Use drone or drone footage to scout for pest damage patterns across a crop field • Identify affected zones on a farm map and recommend organic interventions	
General Objective 8.0: Understand harvesting, storage and handling of organic produce						
14-15	8.1 Explain harvesting and the factors guiding harvest timing in organic systems 8.2 Describe harvesting tools and equipment used in organic crop production 8.3 Explain transport, handling and storage requirements for certified organic produce 8.4 Describe primary processing of freshly harvested organic produce: cleaning, sorting, grading, etc.	• Explain harvest timing and maturity indices for major Nigerian organic crops • Describe harvesting tools • Describe organic produce transport, handling and storage requirements • Explain primary processing steps with farm demonstration • Explain harvest and storage record-keeping for organic	Maturity index charts, harvesting tool display, storage structure, photographs, hermetic bag samples, harvest record form, projector, video, marker board, etc.	• Harvest a crop from the college farm at correct maturity • Record crop name, maturity indicator, date and quantity • Sort and grade harvested produce into three quality grades • Record grading criteria and percentage in each grade • Package 5kg of graded organic produce • Label with crop name, harvest date, farm name and	Guide student to: • Harvest a crop from the college farm at correct maturity • Record crop name, maturity indicator, date and quantity • Sort and grade harvested produce into three quality grades • Record grading criteria and percentage in each grade • Package 5kg of graded organic produce; label with crop name, harvest date, farm name and	College farm crops ready for harvest, harvesting tools, grading bins, packaging materials, label template, open sack, hermetic bags, metal bin, moisture meter, harvest record form, smartphones, PPE, etc.

	8.5 Explain record-keeping requirements for harvesting and storage in certified organic systems	certification		organic claim • Store harvested grain in three containers: open sack, hermetic bag and metal bin • Compare grain condition and insect presence after two weeks • Complete a harvest and storage record form for produce harvested during the session • Fill all required fields	organic claim • Store harvested grain in three containers: open sack, hermetic bag and metal bin • Compare grain condition and insect presence after two weeks • Complete a harvest and storage record form for produce harvested during the session • Fill all required fields	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

COMPOSTING AND BIOFERTILIZER PRODUCTION TECHNIQUES**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: COMPOSTING AND BIOFERTILIZER PRODUCTION TECHNIQUES	COURSE CODE: OAT 114	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 hands-on skills in the production, management, quality assessment and application of compost and biofertilizers as the primary soil fertility inputs in organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the principles and types of composting in organic farming;
- 2.0 Understand how to produce different types of compost using available organic materials;
- 3.0 Understand the principles, types and production of biofertilizers;
- 4.0 Know how to apply compost and biofertilizers to crops in an organic farm;
- 5.0 Understand how to assess the quality and maturity of compost and biofertilizers;
- 6.0 Know how to maintain records for composting and biofertilizer production.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: COMPOSTING AND BIOFERTILIZER PRODUCTION TECHNIQUES	COURSE CODE: OAT 114	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 hands-on skills in the production, management, quality assessment and application of compost and biofertilizers as the primary soil fertility inputs in organic farming systems.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the principles and types of composting in organic farming

1 – 2	1.1 Define composting 1.2 Explain the composting process: aerobic decomposition and temperature phases 1.3 Explain the role of microorganisms, temperature, moisture, aeration and C:N ratio in composting 1.4 Describe types of composting: windrow, cold compost, vermicompost, bokashi and pit composting	• Explain the composting process using a temperature and decomposition diagram • Discuss the role of each composting factor and how to adjust them in practice • Describe each composting type with diagrams and photographs • Discuss allowed and prohibited inputs using the	Composting process diagram, C:N ratio table, composting type photographs, Nigerian Organic Agriculture Standard, projector, marker board, videos, etc.	• Collect and weigh organic materials from the college farm. • Weigh the organic materials from the college farm; calculate the C:N ratio of a proposed blend; adjust to achieve 25–30:1 • Visit an existing compost pile • Measure temperature at three depths, assess moisture and observe colour and smell • Record all observations • Identify ten materials available on the farm as carbon or nitrogen sources;	• Collect and weigh organic materials from the college farm. • Weigh the organic materials from the college farm; calculate the C:N ratio of a proposed blend; adjust to achieve 25–30:1 • Visit an existing compost pile • Measure temperature at three depths, assess moisture and observe colour and smell • Record all observations • Identify ten materials available on the farm as carbon or nitrogen sources;	Weighing scale, C:N ratio table, thermometer, pH meter, existing compost pile, collection bags, classification worksheet, smartphones, PPE, college farm, etc.
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	1.5 List allowed and prohibited inputs for composting in certified organic systems 1.6 Explain the benefits of compost to soil fertility and the environment	Nigerian Organic Agriculture Standard		note any prohibited materials • Classify ten materials available on the farm as carbon or nitrogen sources; note any prohibited materials	note any prohibited materials • Classify ten materials available on the farm as carbon or nitrogen sources; note any prohibited materials	
General Objective 2.0: Understand how to produce different types of compost using available organic materials						
3 – 7				• Construct a windrow (ordinary heap) compost pile of at least 1.5m x 1.5m x 1.5m using layered organic materials • Record all materials, quantities, C:N ratio and starting temperature • Construct a indore heap compost pile of at least 1.5m x 1.5m x 1.5m using layered organic materials • Record all materials, quantities, C:N ratio and starting temperature • Turn the two compost piles weekly for four weeks • Record temperature, moisture, colour and smell at each turning; adjust where needed • Set up and manage a	Guide students to: • Construct a windrow (ordinary heap) compost pile of at least 1.5m x 1.5m x 1.5m using layered organic materials • Record all materials, quantities, C:N ratio and starting temperature • Construct a indore heap compost pile of at least 1.5m x 1.5m x 1.5m using layered organic materials • Record all materials, quantities, C:N ratio and starting temperature • Turn the two compost piles weekly for four weeks • Record temperature, moisture, colour and smell at each turning; adjust where needed	Organic materials, weighing scale, polyethylene sheet thermometer, pH meter, earthworms, vermicomposting bins, EM solution, bokashi container, spades and forks, cress seeds, germination trays, college farm composting area, etc.

				vermicomposting unit; feed with kitchen waste weekly • Record worm population, moisture and vermicompost volume over four weeks • Prepare a bokashi fermentation batch using kitchen waste and EM solution after sealing for two weeks • Record observations on smell, colour and pH • Construct a pit compost of 1m x 1m x 0.5m; layer organic materials, cover and manage • Record condition at each weekly observation • Keep record of all compost production process and materials	• Set up and manage a vermicomposting unit; feed with kitchen waste weekly • Record worm population, moisture and vermicompost volume over four weeks • Prepare a bokashi fermentation batch using kitchen waste and EM solution after sealing for two weeks • Record observations on smell, colour and pH • Construct a pit compost of 1m x 1m x 0.5m; layer organic materials, cover and manage • Record condition at each weekly observation • Keep record of all compost production process and materials	
General Objective 3.0: Understand the principles, types and production of biofertilizers						
8 - 10	3.1 Define biofertilizers 3.2 Explain how they differ from organic fertilizers 3.3 Describe types of biofertilizers: Rhizobium, Azospirillum,	• Explain biofertilizers • Differentiate between organic fertilizers and biofertilizers • Describe each type with	Biofertilizer classification chart, mechanism of action diagrams, EM and FPJ preparation	• Prepare a fermented plant juice (FPJ) using locally available plant materials • Record materials, process, fermentation time and final volume • Prepare an EM biofertilizer solution using rice	Guide students to: • Prepare a fermented plant juice (FPJ) using locally available plant materials • Record materials, process, fermentation time and final volume • Prepare an EM biofertilizer	Fresh plant materials for FPJ, sugar, rice washings, fermentation containers, smartphone, Rhizobium

	mycorrhizal fungi and phosphate-solubilizing bacteria 3.4 Explain the mechanisms of action of each biofertilizer type 3.5 Describe locally available biofertilizer alternatives: fermented plant juice (FPJ) and Effective Microorganisms (EM) 3.6 Explain storage, shelf life and quality requirements of biofertilizer inoculants 3.7 Explain methods of fertilizer application 3.8 Explain fertilizer calculation	mechanism of action diagrams • Describe local biofertilizer alternatives and demonstrate preparation • Discuss storage and quality requirements for biofertilizer inoculants	guides, commercial biofertilizer samples, videos, projector, marker board, etc.	washings and sugar • Ferment for seven day • Record colour, smell and pH at days 1, 3 and 7 • Inoculate cowpea or groundnut seeds with Rhizobium • Plant alongside uninoculated seeds; compare nodulation and growth after three weeks • Apply EM biofertilizer by foliar spray at 1:500 dilution to a crop plot • Record date, crop and any visible response after 7 days	solution using rice washings and sugar; ferment for seven days • Record colour, smell and pH at days 1, 3 and 7 • Inoculate cowpea or groundnut seeds with Rhizobium • Plant alongside uninoculated seeds; compare nodulation and growth after three weeks • Apply EM biofertilizer by foliar spray at 1:500 dilution to a crop plot • Record date, crop and any visible response after 7 days	inoculant, legume seeds, knapsack sprayer, pH meter, college farm plots, etc.
General Objective 4.0: Know how to apply compost and biofertilizers to crops in an organic farm						
11-12				• Calculate the compost quantity needed for a 4m x 4m plot at 10 t/ha; weigh and apply by basal incorporation; record date, method and quantity • Apply vermicompost to one plot and farmyard manure to a second at	Guide students to: • Calculate the compost quantity needed for a 4m x 4m plot at 10 t/ha; weigh and apply by basal incorporation; record date, method and quantity • Apply vermicompost to one plot and farmyard manure	Mature compost, vermicompost, farmyard manure, weighing scale, knapsack sprayer, FPJ biofertilizer, Rhizobium inoculant, legume seeds, college

				equivalent rates • Plant any suitable crop on the plot, monitor and compare crop growth parameters weekly for four weeks • Apply FPJ biofertilizer by foliar spray to a crop plot • Record dilution, date and any crop response after 5 days • Inoculate legume seeds with Rhizobium before planting • Visit the plot after 3 weeks and record nodule formation	to a second at equivalent rates • Plant any suitable crop on the plot, monitor and compare crop growth parameters weekly for four weeks • Apply FPJ biofertilizer by foliar spray to a crop plot • Record dilution, date and any crop response after 5 days • Inoculate legume seeds with Rhizobium before planting • Visit the plot after 3 weeks and record nodule formation	farm plots, monitoring sheet, etc.
General Objective 5.0: Understand how to assess the quality and maturity of compost and biofertilizers						
13-14				• Assess the maturity of both the windrow and indore compost using three methods: germination bioassay, visual assessment and self-heating test • Record results and give a maturity verdict • Compare the rate of decomposition and period of composting for both windrow and indore heap piles	Guide students to: • Assess the maturity of both the windrow and indore compost using three methods: germination bioassay, visual assessment and self-heating test • Record results and give a maturity verdict • Compare the rate of decomposition and period of composting for both windrow and indore heap	Compost produced during course, commercial organic compost sample, cress seeds, germination trays, pH meter or strips, thermometer, moisture meter, quality

				• Compare the quality of the compost produced with a purchased commercial organic compost: measure colour, pH, smell and moisture for each • Assess the quality of the EM biofertilizer produced: measure pH, observe colour and smell • Compare with acceptable quality standards • Prepare a quality assessment report for all compost and biofertilizer products produced during the semester	piles • Compare the quality of the compost produced with a purchased commercial organic compost: measure colour, pH, smell and moisture for each • Assess the quality of the EM biofertilizer produced: measure pH, observe colour and smell • Compare with acceptable quality standards • Prepare a quality assessment report for all compost and biofertilizer products produced during the semester	assessment report template, PPE, smartphones, etc.
General Objective 6.0: Know how to maintain records for composting and biofertilizer production						
15				• Complete a composting record for the windrow and indore heap piles managed during this course: include establishment date, materials, turning dates, temperature readings and maturity test results • Complete a biofertilizer production record for the FPJ and EM solutions: include production date, materials, fermentation	Guide students to: • Complete a composting record for the windrow and indore heap piles managed during this course: include establishment date, materials, turning dates, temperature readings and maturity test results • Complete a biofertilizer production record for the FPJ and EM solutions: include production date,	Composting record template, biofertilizer production record template, smartphones or computers with Google Sheets, peer review checklist, etc.

				period and quality assessment results • Enter all composting and biofertilizer records into Google Sheets • Organise by date and product • Export as PDF and submit • Present the temperature curve	materials, fermentation period and quality assessment results • Enter all composting and biofertilizer records into Google Sheet • Organise by date and product; export as PDF and submit • Present the temperature curve • Students to peer-review their records using checklist • Provide one specific improvement comment	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

PEST AND DISEASE MANAGEMENT IN ORGANIC SYSTEMS**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: PEST AND DISEASE MANAGEMENT IN ORGANIC SYSTEMS	COURSE CODE: OAT 115	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 provide students with the knowledge and practical skills to identify, monitor and manage crop pests and diseases using organic and agroecological methods in a certified organic production system.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the principles of organic crop protection and integrated pest management (IPM);
- 2.0 Know how to identify and manage plant diseases in organic crop production;
- 3.0 Understand how to identify and manage insect pests of crops in organic systems;
- 4.0 Understand weed management in organic crop production;
- 5.0 Understand how to identify and manage nematode pests in organic systems;
- 6.0 Know how to identify and manage vertebrate pests in organic systems;
- 7.0 Understand how to prepare, apply and evaluate botanical and biological control materials.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: PEST AND DISEASE MANAGEMENT IN ORGANIC SYSTEMS	COURSE CODE: OAT 115	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 provide students with the knowledge and practical skills to identify, monitor and manage crop pests and diseases using organic and agroecological methods in a certified organic production system.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand the principles of organic crop protection and integrated pest management (IPM)						
1 – 2	1.1 Define organic crop protection 1.2 Explain organic crop protection importance 1.3 Explain the hierarchy of pest management in organic systems: prevention, monitoring, intervention, etc. 1.4 Describe allowed and prohibitive methods of crop protection in certified organic systems 1.5 Describe prohibited pest control inputs in certified organic systems	• Explain organic crop protection principles • Describe allowed and prohibitive methods of crop protection in certified organic systems • Describe prohibited inputs using the Nigerian Organic Agriculture Standard as a guide • Explain correct PPE use before any spray activity	IPM decision ladder chart, allowed and prohibited inputs list, Nigerian Organic Agriculture Standard, PPE display, projector, marker board, videos, etc.	• Identify ten plants on the college farm for pest and disease presence • Record pest found, plant part affected, severity and recommended IPM action • Use the IPM decision ladder to determine the organic intervention for three problems found on the college farm • Justify each decision in writing • Demonstrate correct PPE donning and doffing; • Demonstrate correct PPE use before any spray activity	Guide students to: • Identify ten plants on the college farm for pest and disease presence • Record pest found, plant part affected, severity and recommended IPM action • Use the IPM decision ladder to determine the organic intervention for three problems found on the college farm • Justify each decision in writing • Demonstrate correct PPE donning and	Field scouting form, IPM decision ladder, economic threshold reference table, PPE set, college farm plots, field notebooks, smartphones, calculators, etc.

	1.6 Explain the IPM decision ladder in organic farming and PPE requirements for applying crop protection materials			- Count pest numbers on a 10m crop row at five sampling points - Calculate mean pest density per m² - Compare with an economic threshold - Keep all necessary record	doffing; - Demonstrate correct PPE use before any spray activity - Count pest numbers on a 10m crop row at five sampling points - Calculate mean pest density per m² - Compare with an economic threshold - Keep all necessary record	
General Objective 2.0: Know how to identify and manage plant diseases in organic crop production						
3 – 4	2.1 Explain the disease triangle: host, pathogen and environment 2.2 List common diseases of Nigerian crops caused by fungi, bacteria and viruses 2.3 Describe the symptoms, spread and effects of common crop diseases in Nigeria 2.4 Explain disease management in organic farming: cultural practices, resistant varieties,	- Explain the disease triangle and how organic practices reduce disease occurrence - Describe common Nigerian crop diseases using photographs - Describe disease management in organic farming with emphasis on prevention-first approach - Describe allowed	Disease triangle diagram, crop disease photographs, diseased plant specimens, organic disease management chart, projector, marker board, video clips, etc.	- Identify disease common name, probable cause and describe symptoms for each - Apply a copper-based organic fungicide to a plot with early fungal disease signs - Record preparation, rate and coverage - Observe disease progress after 7 days - Demonstrate two cultural disease management practices: roguing infected plants and adjusting plant spacing	Guide students to: - Identify disease common name, probable cause and describe symptoms for each - Apply a copper-based organic fungicide to a plot with early fungal disease signs - Record preparation, rate and coverage; observe disease progress after 7 days - Demonstrate two cultural disease management practices: roguing infected plants	Disease identification guide, diseased specimens, copper hydroxide or Bordeaux mixture, knapsack sprayer, PPE, drone or drone footage, disease album materials, farm sketch map, smartphones, etc.

	biological control and allowed botanical fungicides	fungicide treatments in certified organic systems		• Use drone or drone footage to assess disease spread patterns across a crop field • Identify hotspots on a farm map and recommend targeted organic management • Keep all necessary records	and adjusting plant spacing • Use drone or drone footage to assess disease spread patterns across a crop field • Identify hotspots on a farm map and recommend targeted organic management • Keep all necessary records	
General Objective 3.0: Understand how to identify and manage insect pests of crops in organic systems						
5 – 7	3.1 Describe the features of insects 3.2 Classify features of insects by mouthpart type: biting, sucking and boring 3.3 Describe complete and incomplete metamorphosis 3.4 Relate damage type to mouthpart 3.5 List common insect pests of major Nigerian crops and describe their damage 3.6 Describe organic insect pest management: biological control, botanical pesticides,	• Explain insect features and mouthpart types using diagrams and specimens • Describe life cycles using complete and incomplete metamorphosis diagrams • Describe common pests of Nigerian crops with crop damage photographs • Describe organic management methods with	Insect mouthpart diagrams, life cycle diagrams, crop pest photographs, damage photographs, organic management chart, PPE display, projector, marker board, videos, etc.	• Collect 15 insect specimens from the college farm; • Label each with common name, mouthpart type, crop affected, damage type and organic control • Prepare an insect album • Set up pitfall and yellow sticky traps on the farm • Carry out collection and identify insects after 48 hours • Record species and numbers • Prepare neem extract at 5% • Calibrate a knapsack	Guide students to: • Collect 15 insect specimens from the college farm; • Label each with common name, mouthpart type, crop affected, damage type and organic control • Prepare an insect album • Set up pitfall and yellow sticky traps on the farm • Carry out collection and identify insects after 48 hours • Record species and numbers	Insect collecting jars and nets, mounting board, pitfall and sticky traps, boots, raincoat, neem leaves, extraction equipment, knapsack sprayer, PPE, drone or drone footage, farm sketch map, insect identification guide, smartphones, etc.

	physical and cultural methods 3.7 Explain safe handling of botanical pesticides and PPE requirements	emphasis on biological and botanical approaches		sprayer; • Apply to an infested plot • Count pest numbers before and 7 days after application • Observe natural enemies on a crop plot • Document species, prey and estimated density • Use drone or drone footage to map pest damage distribution across a crop field • Identify heavily infested zones and recommend targeted organic intervention • Keep record of all activities	• Prepare neem extract at 5% • Calibrate a knapsack sprayer; • Apply to an infested plot • Count pest numbers before and 7 days after application • Observe natural enemies on a crop plot • Document species, prey and estimated density • Use drone or drone footage to map pest damage distribution across a crop field • Identify heavily infested zones and recommend targeted organic intervention • Keep record of all activities	
General Objective 4.0: Understand weed management in organic crop production						
8 – 9	4.1 Define weed 4.2 Explain the classification of weed by life cycle and morphology 4.3 Describe the effects of weeds on organic crops	• Explain and classify weeds using specimens and photographs • Explain weed competition effects with yield	Weed specimens or photographs, weed classification chart, organic weed management	• Collect 20 weed specimens • Classify by life cycle and morphology; • Prepare a weed album with photograph or pressed specimen for each • Carry out manual weeding	Guide students to: • Collect 20 weed specimens • Classify by life cycle and morphology • Prepare a weed album with photograph or	College farm, weed collection bags, camera or press, weed identification guide, weighing scale, mulch materials, PPE,

	4.4 Explain cultural, biological and integrated weed control in organic systems 4.5 Describe the use of cover crops, mulching and rotation for long-term weed suppression	loss data - Describe organic weed management methods with farm demonstrations - Explain long-term strategies with cover crop and mulch examples	diagrams, cover crop photographs, projector, marker board, videos, etc.	on a field plot - Apply mulch at 10cm depth to a 2m x 4m plot - Compare weed emergence with an unmulched control after two weeks - Establish a cover crop between crop rows - Record weed and crop growth at weeks 2 and 4 - Record weed composition, density per m², time taken and biomass removed - Keep record of all activities	pressed specimen for each - Carry out manual weeding on a field plot; - Apply mulch at 10cm depth to a 2m x 4m plot - Compare weed emergence with an unmulched control after two weeks - Establish a cover crop between crop rows - Record weed and crop growth at weeks 2 and 4 - Record weed composition, density per m², time taken and biomass removed - Keep record of all activities	cover crop seeds, measuring tape, field notebooks, smartphones, etc.
General Objective 5.0: Understand how to identify and manage nematode pests in organic systems						
10-11	5.1 Define nematodes 5.2 Explain their importance as crop pests in Nigeria 5.3 List common nematode pests of Nigerian crops and describe symptoms on roots 5.4 Explain the mode of damage and	- Explain nematode biology and crop damage using diagrams - Explain their importance as crop pests in Nigeria - Describe common	Nematode life cycle diagram, nematode-infested root photographs, organic management chart, microscope, projector, marker board,	- Collect root samples from suspected nematode-infested plants; examine for galls, lesions and cysts; photograph and record observations - Extract soil nematodes from 100g of infested soil using the Baermann funnel; observe under microscope and record	Guide students to: - Collect root samples from suspected nematode-infested plants; examine for galls, lesions and cysts; photograph and record observations - Extract soil nematodes from 100g of infested soil using the Baermann	Nematode-infested root samples, Baermann funnel, microscope or hand lens, neem cake, weighing scale, crop rotation planning template, field notebooks, PPE, cameras, smartphones, etc.

	economic effects of nematodes 5.5 Describe nematode management in an organic system: rotation with trap crops, organic amendments and solarisation	nematode pests and describe root symptoms with photographs Describe nematode management in an organic system with practical examples	videos, etc.	numbers and features visible - Apply neem cake to a nematode-infested plot; record rate, date and method - Plan to monitor root condition at harvest - Design a two-year rotation for a nematode-infested plot using at least one trap crop - Explain the suppression mechanism of each crop - Keep record of all activities	funnel; observe under microscope and record numbers and features visible - Apply neem cake to a nematode-infested plot; record rate, date and method - Plan to monitor root condition at harvest - Design a two-year rotation for a nematode-infested plot using at least one trap crop - Explain the suppression mechanism of each crop - Keep record of all activities	
General Objective 6.0: Know how to identify and manage vertebrate pests in organic systems						
12	6.1 Describe common vertebrate pests of crops in Nigeria: rodents, birds and wild mammals 6.2 Explain crops commonly damaged and the nature of damage caused 6.3 Describe organic methods of vertebrate pest management: barriers, traps, scare	- Describe common vertebrate pests with photographs - Explain types of crop damage caused by rodents, birds and mammals - Describe allowed organic management methods	Vertebrate pest photographs, organic management diagrams, Nigerian Organic Agriculture Standard, projector, marker board, videos, etc.	- Identify vertebrate pest signs on the college farm or nearby: record damage signs, crops affected and estimated losses - Construct a snap trap and cage trap for rodent control - Set snap trap and cage trap for rodent control - Inspect after 48 hours and record findings - Set up a bird scare device	Guide students to: - Identify vertebrate pest signs on the college farm or nearby: record damage signs, crops affected and estimated losses - Construct a snap trap and cage trap for rodent control - Set snap trap and cage trap for rodent control - Inspect after 48 hours	Snap traps, cage traps, bait materials, bird scare materials, netting or fencing for design exercise, barrier design template, field notebooks, smartphones, cameras, PPE, etc.

	devices and repellents 6.4 Explain prohibited vertebrate pest control methods in certified organic systems	Describe prohibited methods using the Nigerian Organic Agriculture Standard		in a crop plot - Assess effectiveness based on damage observation after one week - Design a physical barrier layout for a 20m x 20m plot - Specify materials, dimensions and estimated cost - Keep record of all activities	and record findings - Set up a bird scare device in a crop plot; assess effectiveness based on damage observation after one week - Design a physical barrier layout for a 20m x 20m plot - Specify materials, dimensions and estimated cost - Keep record of all activities	
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General Objective 7.0: Understand how to prepare, apply and evaluate botanical and biological control materials

13-15	7.1 Explain botanical pesticides used in organic farming: neem, chilli, garlic, wood ash, tephrosia, etc. 7.2 Describe preparation methods for each botanical pesticide 7.3 Explain the mechanism of action and target pests for each botanical material 7.4 Describe biological control agents used in certified organic	- Explain each botanical pesticide with source plant photographs and mechanism of action - Describe preparation methods and demonstrate on the college farm - Explain biological control agents with product label	Botanical plant samples, preparation guide, biological control product labels, projector, marker board, etc.	- Identify botanical materials/plants that are available locally. - Prepare four botanical formulations: neem leaf extract, neem seed kernel extract (NSKE) 5%, chilli-garlic spray and wood ash suspension; - Record method, concentration, target pest and shelf life for each - Conduct a bioassay: apply each botanical to petri dishes containing ten aphids or caterpillars	Guide students to: - Identify botanical materials/plants that are available locally. - Prepare four botanical formulations: neem leaf extract, neem seed kernel extract (NSKE) 5%, chilli-garlic spray and wood ash suspension; - Record method, concentration, target pest and shelf life for each - Conduct a bioassay:	Neem leaves, neem seeds, chilli, garlic, wood ash, extraction containers, Trichoderma product, knapsack sprayer, PPE, petri dishes, test insects, logbook template, smartphone, college farm plots, etc.
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	systems: Bt, Trichoderma, predatory insects, etc 7.5 Explain storage, shelf life and handling of botanical and biological control materials	examples • Discuss storage and shelf life requirements	• Record mortality at 24 and 48 hours and compare efficacy • Apply NSKE 5% to an infested crop plot; calibrate the sprayer first • Record details and compare pest counts before and 7 days after • Apply a Trichoderma-based biological control to a plot with early soil-borne fungal disease • Record method, rate and disease incidence at 14 days • Complete a pest management logbook for all botanical and biological control activities during this course: record date, product, target pest, rate, area treated and effectiveness	apply each botanical to petri dishes containing ten aphids or caterpillars • Record mortality at 24 and 48 hours and compare efficacy • Apply NSKE 5% to an infested crop plot; calibrate the sprayer first • Record details and compare pest counts before and 7 days after • Apply a Trichoderma-based biological control to a plot with early soil-borne fungal disease • Record method, rate and disease incidence at 14 days • Complete a pest management logbook for all botanical and biological control activities during this course: record date, product, target pest, rate, area treated and effectiveness	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10%					

Practical:	40%
Examination:	40%
Total:	100%



CLIMATE-SMART AND SUSTAINABLE AGRICULTURE**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: CLIMATE-SMART AND SUSTAINABLE AGRICULTURE	COURSE CODE: OAT 116	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 practical skills to apply climate-smart and sustainable agricultural practices that increase productivity, build resilience and reduce greenhouse gas emissions in organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand climate change and its effects on agriculture in Nigeria;
- 2.0 Understand the principles and practices of Climate-Smart Agriculture (CSA);
- 3.0 Know agroforestry practices in organic farming systems;
- 4.0 Understand water harvesting and conservation practices on organic farms;
- 5.0 Know how to apply climate-smart soil management practices;
- 6.0 Know how to use digital tools to monitor and document climate-smart farm practices;
- 7.0 Understand climate-smart livestock integration in organic farming systems;
- 8.0 Understand how to prepare a whole-farm climate adaptation plan.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: CLIMATE-SMART AND SUSTAINABLE AGRICULTURE	COURSE CODE: OAT 116	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 practical skills to apply climate-smart and sustainable agricultural practices that increase productivity, build resilience and reduce emissions in organic farming systems.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand climate change and its effects on agriculture in Nigeria

1 – 2	1.1 Explain climate change: causes, greenhouse gas emissions and the greenhouse effect 1.2 Describe observed effects of climate change on agriculture in Nigeria: shifting rainfall, flooding, rising temperatures, etc. 1.3 Explain the vulnerability of smallholder farmers to climate change in Nigeria 1.4 Explain how	• Explain climate change using a greenhouse effect diagram • Discuss climate change effects on Nigerian agriculture using NIMET data • Explain smallholder farmers vulnerability with Northern Nigeria case studies • Discuss OA climate mitigation potential using carbon sequestration data • Discuss how conventional farming	Greenhouse effect diagram, NIMET climate data, FMA&FS climate and agriculture report, carbon sequestration data, projector, marker board, video clips, etc.	• Collect rainfall data for the past 10 years from NIMET • Plot an annual rainfall trend graph • Analyse the trend and relate it to agricultural production risk • Walk through the college farm or nearby farmland • Record and photograph five visible signs of climate stress on crops or soil • Interview three local farmers on weather changes over the past ten years • Summarise how climate change has affected their farming	Guide students to: • Collect rainfall data for the past 10 years from NIMET • Plot an annual rainfall trend graph • Analyse the trend and relate it to agricultural production risk • Walk through the college farm or nearby farmland • Record and photograph five visible signs of climate stress on crops or soil	NIMET rainfall data, graph paper or computers with Excel, climate observation checklist, smartphones, farmer interview guide, risk assessment template, transport, smartphones, PPE, etc.
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	conventional farming contributes to climate change 1.5 Explain how organic agriculture contributes to climate change mitigation	contributes to climate change • Discuss how OA contribute to climate change mitigation		• Prepare a climate risk assessment for the college farm • Identify three climate risks and recommend one organic adaptation for each	• Interview three local farmers on weather changes over the past ten years • Summarise how climate change has affected their farming • Prepare a climate risk assessment for the college farm • Identify three climate risks and recommend one organic adaptation for each	
General Objective 2.0: Understand the principles and practices of Climate-Smart Agriculture (CSA)						
3 – 4	2.1 Define CSA 2.2 Explain the CSA three pillars: increased productivity, enhanced resilience and reduced emissions 2.3 Describe key CSA practices for organic farming: drought-tolerant varieties, conservation agriculture, agroforestry and water management	• Define CSA and explain its three pillars using a diagram • Describe key CSA practices with Nigerian organic farm examples • Explain the triple-win concept with a Nigerian case study • Describe climate-smart crop management with planting calendar	CSA three pillars diagram, Nigerian organic farm CSA examples, triple-win case study, planting calendar template, projector, video marker board, etc.	• Compare an early-maturing and a late-maturing variety planted on the same date on the college farm • Record germination, canopy development and days to first flower for each • Design a climate-smart crop management calendar for one rainfed crop: adjust planting date, select an early-maturing variety and include one water conservation practice • Conduct a triple-win	Guide students to: • Compare an early-maturing and a late-maturing variety planted on the same date on the college farm • Record germination, canopy development and days to first flower for each • Design a climate-smart crop management calendar for one	Early and late maturing crop variety seeds, college farm plots, crop calendar template, triple-win analysis table, smartphones with internet, PPE, etc.

	2.4 Explain the triple-win concept: food security, adaptation and mitigation at the same time 2.5 Describe climate-smart crop management: adjusted planting dates and early-maturing varieties	examples		analysis for one organic practice on the college farm: record how it contributes to productivity, resilience and emission reduction in a three-column table • Access a CSA website or database on a smartphone • Identify three CSA practices suitable for Nigerian organic farmers	rainfed crop: adjust planting date, select an early-maturing variety and include one water conservation practice • Conduct a triple-win analysis for one organic practice on the college farm: record how it contributes to productivity, resilience and emission reduction in a three-column table • Access a CSA website or database on a smartphone; identify three CSA practices suitable for Nigerian organic farmers	
General Objective 3.0: Know agroforestry practices in organic farming systems						
5 – 6	3.1 Define agroforestry 3.2 Describe agroforestry types: alley cropping, windbreaks, parkland and home gardens	• Define agroforestry and describe its types with diagrams and Nigerian farm photographs • Explain benefits of agroforestry using	Agroforestry type diagrams, multipurpose tree profile cards, alley cropping layout diagram, International	• Establish an alley cropping strip on the college farm: plant Gliricidia or Leucaena cuttings along a 10m row • Record spacing, planting date and establishment rate after 2 weeks	Guide students to: • Establish an alley cropping strip on the college farm: plant Gliricidia or Leucaena cuttings along a 10m row	Gliricidia or Leucaena cuttings, food crop seeds, multipurpose tree seedlings, measuring

	3.3 Explain the benefits of agroforestry in organic farming: nitrogen fixation, shade, fodder, carbon storage, etc. 3.4 Describe multipurpose tree species used in Nigeria: Gliricidia, Leucaena, Faidherbia albida, shea, etc. 3.5 Explain how to establish alley cropping and windbreak systems on organic farms	field data from Nigerian organic farms • Explain each tree species with establishment requirements and uses • Explain alley cropping and windbreak establishment with farm layout diagrams	Council for Research in Agroforestry (ICRAF) data, projector, video marker board, etc.	• Establish a windbreak of at least 10 trees on the windward boundary of a college farm plot • Record species, spacing and planting date • Identify existing trees on the college farm • Record species, canopy spread and any positive effects observed on adjacent crops • Use drone or drone footage to assess tree cover on a nearby farm • Sketch tree locations on a farm map and estimate canopy coverage percentage	• Record spacing, planting date and establishment rate after 2 weeks • Establish a windbreak of at least 10 trees on the windward boundary of a college farm plot • Record species, spacing and planting date • Identify existing trees on the college farm • Record species, canopy spread and any positive effects observed on adjacent crops • Use drone or drone footage to assess tree cover on a nearby farm • Sketch tree locations on a farm map and estimate canopy coverage percentage	tape/tools, pegs, spades, tree identification guide, drone or drone footage, smartphones, PPE, farm sketch map, etc.
General Objective 4.0: Understand water harvesting and conservation practices on organic farms						
7 – 9	4.1 Explain the importance of water	• Explain water harvesting	Water harvesting technique	• Construct tied ridges on a 10m x 10m sloped plot;	Guide students to: • Construct tied ridges	Hoes, pegs, measuring

	harvesting in semi-arid and sub-humid zones of Nigeria 4.2 Describe in-field water harvesting techniques: tied ridges, Zai pits, half-moon catchments, contour bunds, etc. 4.3 Describe farm water storage structures: ponds, tanks, drums, roof catchment, etc. 4.4 Describe water conservation practices: mulching, minimum tillage, cover cropping, etc. 4.5 Explain how drone and GPS tools can help identify water flow patterns on a farm	importance with Nigerian rainfall variability data • Describe each in-field water harvesting technique with cross-section diagrams • Describe farm water storage structures with photographs and construction notes • Describe water conservation practices and their combined effect on soil moisture • Explain drone and GPS use for water flow mapping with example images	diagrams, storage structure photographs, rainfall variability data, GPS smartphone app, drone or drone footage, projector, video, marker board, etc.	record spacing, height and time taken • Measure soil moisture inside and outside ridges after the next rainfall • Dig three Zai pits in a bare area; fill with compost and plant one seed each • Record germination and growth after 2 weeks • Site a position for a farm pond or catchment using a GPS app and hand level • Record coordinates, slope direction and estimated catchment area • Use drone or drone footage to identify water runoff pathways on the farm • Annotate a farm map with recommended water harvesting structure positions • Apply mulch to one plot and leave one bare; irrigate both equally • Measure soil moisture at 24 and 48 hours and compare retention	on a 10m x 10m sloped plot; record spacing, height and time taken • Measure soil moisture inside and outside ridges after the next rainfall • Dig three Zai pits in a bare area; fill with compost and plant one seed each • Record germination and growth after 2 weeks • Site a position for a farm pond or catchment using a GPS app and hand level • Record coordinates, slope direction and estimated catchment area • Use drone or drone footage to identify water runoff pathways on the farm Annotate a farm map with recommended water harvesting structure	tape/tools, compost, crop seeds, GPS smartphone app, hand level or water-bottle level, soil moisture meter, drone or drone footage, farm sketch map, mulch materials, PPE, etc.
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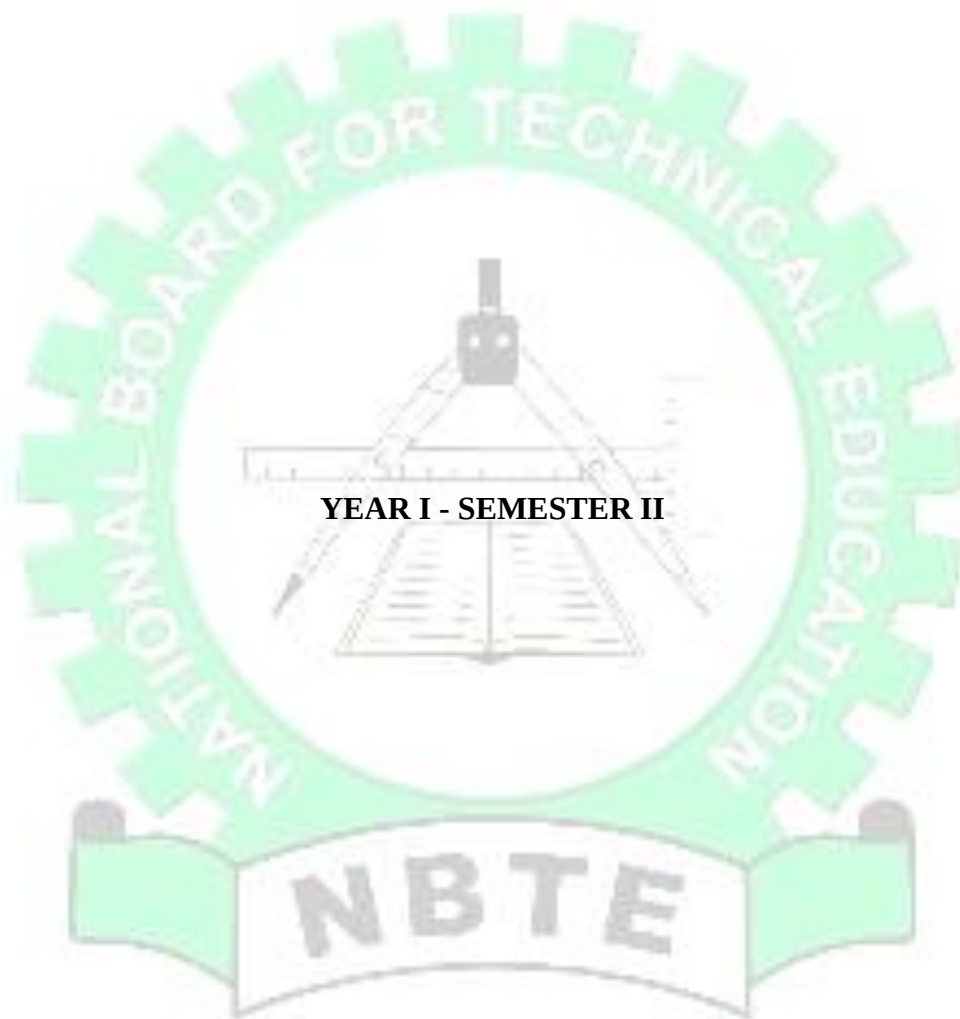
					positions • Apply mulch to one plot and leave one bare; irrigate both equally • Measure soil moisture at 24 and 48 hours and compare retention	
General Objective 5.0: Know how to apply climate-smart soil management practices						
10 – 11	5.1 Explain the role of soil organic matter (SOM) in climate-smart farming: carbon storage and water retention 5.2 Describe climate-smart soil practices: minimum tillage, permanent soil cover, compost application and biochar 5.3 Explain how to prepare and apply biochar from crop residues as a soil amendment. 5.4 Describe indicators of a healthy climate-smart organic soil.	• Explain SOM role in climate-smart farming using a carbon cycle diagram • Describe each practice with photographs and farm examples • Explain biochar production from crop residues and application • Describe healthy soil indicators and demonstrate assessment on the farm	Carbon cycle diagram, climate-smart soil practice photographs, biochar production guide, soil health indicator chart, projector, video, marker board, etc.	• Assess soil health on two college farm plots using five indicators: earthworm count, water infiltration, colour, aggregate stability and structure; record and compare results • Apply compost to one plot, maintain minimum tillage on a second plot and mulch cover on a third plot • Monitor soil temperature and moisture in all the three plots weekly for three weeks • Prepare biochar from crop residues using a metal drum • Record process, raw material weight and biochar yield • Prepare a climate-smart soil management action plan for	Guide students to: • Assess soil health on two college farm plots using five indicators: earthworm count, water infiltration, colour, aggregate stability and structure; record and compare results • Apply compost to one plot, maintain minimum tillage on a second plot and mulch cover on a third plot • Monitor soil temperature and moisture in all the three plots weekly for three weeks	College farm plots, spades, infiltration equipment, soil colour chart, moisture meter, thermometer, crop residues for biochar, metal drum, PPE, soil management action plan template, etc.

				a 1-hectare organic farm: specify practices, timing and expected soil health benefit.	• Prepare biochar from crop residues using a metal drum • Record process, raw material weight and biochar yield • Prepare a climate-smart soil management action plan for a 1-hectare organic farm: specify practices, timing and expected soil health benefit.	
General Objective 6.0: Know how to use digital tools to monitor and document climate-smart farm practices						
12	6.1 Explain how digital tools support climate-smart farming: weather apps, GPS, satellite imagery, drone technology, etc. 6.2 Describe free digital tools for Nigerian organic farmers: NIMET app, Google Earth, KoBoToolbox, WhatsApp for extension, etc. 6.3 Explain how to monitor farm-level changes over time using Google Earth satellite images	• Explain digital tools with live demonstration on a smartphone • Describe each tool with farming use • Describe Google Earth historical image comparison • Describe KoBoToolbox form design and mobile data collection	Smartphones with internet, NIMET app or website, Google Earth, KoBoToolbox account, projector, video, marker board, etc.	• Access Google Earth on a smartphone • Compare images of the college farm from two different years • Identify and document three visible changes in vegetation or land use • Design a KoBoToolbox form with at least eight fields for monitoring climate-smart practices on a farm • Test the form in the field • Use a weather forecast app to prepare a one-week farm work plan aligning	Guide students to: • Access Google Earth on a smartphone • Compare images of the college farm from two different years • Identify and document three visible changes in vegetation or land use • Design a KoBoToolbox form with at least eight fields for monitoring	Smartphones or computers with internet, Google Earth app, KoBoToolbox account, NIMET website, farm work plan template, weather forecast apps, PPE, etc.

	6.4 Explain how to collect farm monitoring data using KoBoToolbox			planting, spraying and composting with forecast weather	climate-smart practices on a farm • Test the form in the field • Use a weather forecast app to prepare a one-week farm work plan aligning planting, spraying and composting with forecast weather	
General Objective 7.0: Understand climate-smart livestock integration in organic farming systems						
13	7.1 Explain the role of livestock in climate-smart organic farming: manure for fertility, income diversification, food security, etc. 7.2 Describe climate-smart livestock management practices: rotational grazing, silvopastoral systems, improved fodder, etc. 7.3 Describe how livestock manure is integrated into the organic soil fertility system	• Explain livestock role in climate-smart OA with Nigerian mixed farming examples • Describe each climate-smart livestock practice with farm photographs • Describe manure integration using a crop-livestock system diagram • Explain mixed crop-livestock systems using a farm systems diagram	Mixed crop-livestock diagram, climate-smart livestock practice photographs, manure management guide, projector, video, marker board, etc.	• Visit the college farm livestock unit or a nearby mixed farm • Document how manure is collected, stored and applied to crops • Record species kept and estimated daily manure production • Design a rotational grazing plan for a 2-hectare pasture divided into four paddocks specify paddock size, rotation interval and rest period • Present as a diagram • Design a simple silvopastoral system for a 1-hectare organic farm	Guide students to: • Visit the college farm livestock unit or a nearby mixed farm • Document how manure is collected, stored and applied to crops • Record species kept and estimated daily manure production • Design a rotational grazing plan for a 2-hectare pasture divided into four paddocks specify paddock size, rotation interval and	College farm livestock unit or nearby mixed farm, observation form, rotational grazing plan template, silvopastoral design template, field notebooks, transport, smartphones, PPE, etc.

	7.4 Explain the concept of mixed crop-livestock farming as a climate-smart organic system			- Specify tree species, spacing, pasture species and livestock type - Identify the climate and soil benefits	- rest period - Present as a diagram - Design a simple silvopastoral system for a 1-hectare organic farm - Specify tree species, spacing, pasture species and livestock type - Identify the climate and soil benefits	
General Objective 8.0: Understand how to prepare a whole-farm climate adaptation plan						
14 – 15	8.1 Explain the purpose and components of a whole-farm climate adaptation plan 8.2 Describe the components: climate risk assessment, practices selected, implementation schedule and monitoring indicators 8.3 Explain how to document a whole-farm CSA plan using digital apps. (e.g Google Docs or Google Sheets) 8.4 Describe how to monitor and review	- Explain the whole-farm plan concept using a sample plan document - Describe how to document the plan using digital apps. (e.g Google Docs or Google Sheets) - Explain monitoring and review using field checklists and digital records	Sample whole-farm climate adaptation plan, plan template in Google Docs, monitoring checklist, smartphones or computers with Google Docs and Sheets, projector, video, marker board, etc.	- Prepare a whole-farm climate adaptation plan for the college farm: include three climate risks, five CSA practices, a monthly implementation schedule and three monitoring indicators per practice - Enter the plan into a use Google Sheets to create a monitoring schedule table - Share with the lecturer for review - Use drone or drone footage to conduct a final aerial farm assessment - Compare current vegetation cover, water structures and tree cover with the farm	Guide students to: - Prepare a whole-farm climate adaptation plan for the college farm: include three climate risks, five CSA practices, a monthly implementation schedule and three monitoring indicators per practice - Enter the plan into a use Google Sheets to create a monitoring schedule table	Whole-farm CSA plan template, Google Docs and Sheets on smartphones or computers, drone or drone footage, earlier farm sketch map, presentation rubric, projector, PPE, etc.

	the plan over time using field checklists and digital records		sketch from the start of the course • Document changes in a progress report • Present the whole-farm climate adaptation plan to the class • Develop presentation slides to explain the top climate risk, three CSA practices and one monitoring indicator.	• Share with the lecturer for review • Use drone or drone footage to conduct a final aerial farm assessment • Compare current vegetation cover, water structures and tree cover with the farm sketch from the start of the course • Document changes in a progress report • Present the whole-farm climate adaptation plan to the class • Develop presentation slides to explain the top climate risk, three CSA practices and one monitoring indicator.	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%					



ORGANIC LIVESTOCK AND INTEGRATED FARMING SYSTEMS

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ORGANIC LIVESTOCK AND INTEGRATED FARMING SYSTEMS	COURSE CODE: OAT 121	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 knowledge and practical skills to manage organic livestock enterprises and integrate livestock into organic farming systems.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles and importance of organic livestock production; 2.0 Know the management of cattle in organic farming systems; 3.0 Know the management of sheep and goats in organic farming systems; 4.0 Know the management of pigs in organic farming systems; 5.0 Understand integrated crop-livestock farming systems in organic agriculture; 6.0 Understand organic animal nutrition and feeding practices; 7.0 Understand health and welfare management in organic livestock systems.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ORGANIC LIVESTOCK AND INTEGRATED FARMING SYSTEMS		COURSE CODE: OAT 121		CONTACT HOURS: 3 HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and practical skills to manage organic livestock enterprises and integrate livestock into organic farming systems.						
GENERAL OBJECTIVE 1.0: Understand the principles and importance of organic livestock production						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define organic livestock production 1.2 Explain organic livestock production importance in Nigeria 1.3 Describe the principles of organic livestock production: natural living conditions, access to pasture, prohibition of routine antibiotics, synthetic hormones and use of hazardous chemicals and non-inclusion of Genetical Modified Organisms (GMOs) and others 1.4 Explain the difference between organic and conventional livestock management 1.5 List the major livestock	• Explain the basic concepts of organic livestock farming • Explain organic livestock principles using the Nigerian Organic Agriculture Standard • Explain organic and conventional livestock management using a table • Discuss major livestock species kept organically in Nigeria • Explain organic livestock certification	Projector, marker board, Nigerian Organic Agriculture Standard, livestock photographs, organic vs conventional comparison chart, videos, etc.	• Visit an organic or smallholder livestock farm; observe and record housing, feeding, animal welfare conditions and general management. • Compare the housing and feeding of livestock on an organic farm and a conventional farm • Identify note at least five differences • Interview a livestock farmer on their feeding and health management practices; present findings to the	Guide students to: • Visit an organic or smallholder livestock farm; observe and record housing, feeding, animal welfare conditions and general management. • Compare the housing and feeding of livestock on an organic farm and a conventional farm • Identify note at least five differences • Interview a livestock farmer on their feeding and health	Nearby livestock farm, observation checklist, farmer interview guide, smartphones, field notebooks, transport, PPE, etc.

	species kept in organic systems in Nigeria and their importance 1.6 Describe the basic requirements for a farm to achieve organic livestock certification. 1.7 Explain local and international standard in organic farming practices to promote trade including export in organic livestock farming	requirements in simple terms. • Discuss local and international standard in organic farming practices to promote trade including export in organic livestock farming		class • Use a smartphone to photograph the farm layout • Prepare a simple labelled sketch of the livestock unit • Inspect farm record to conform with organic farm practices	management practices; present findings to the class • Use a smartphone to photograph the farm layout • Prepare a simple labelled sketch of the livestock unit • Inspect farm record to conform with organic farm practices	
General Objective 2.0: Know the management of cattle in organic farming systems						
3 – 4	2.1 Explain the common cattle breeds kept in Nigeria and their production characteristics. 2.2 Explain housing requirements for cattle in organic systems 2.3 Describe feeding of cattle in organic systems 2.4 Explain state of wellbeing 2.5 Explain cattle reproduction management	• Describe the common cattle breeds kept in Nigeria and their production characteristics: Sokoto Gudali, White Fulani, Red Bororo, Muturu, etc. • Discuss housing requirements for cattle in organic systems: space allowance, distribution of feeding and water trough, ventilation, sanitation/cleaning and shades • Describe feeding of	Cattle breed photographs, housing design diagram, feeding guide, reproductive cycle chart, body condition scoring chart, projector, marker board, etc.	• Identify at least three cattle breeds on the college farm or nearby farm; record breed name, body characteristics and main product • Identify the stock by age and reproductive status • Carry out body condition scoring on three cattle • Record scores and relate to feeding adequacy • Observe and record the housing conditions of cattle on a farm:	Guide students to: • Identify at least three cattle breeds on the college farm or nearby farm; record breed name, body characteristics and main product • Identify the stock by age and reproductive status • Carry out body condition scoring on three cattle • Record scores and relate to feeding adequacy • Observe and record the housing	College/Nearby cattle farm , body condition scoring chart, weighing scale, feed, field notebooks, transport, PPE, smartphones, etc.

		cattle in organic systems: pastures and grazing, hay, silage and organic concentrate supplementation • Discuss state of wellbeing: apparently healthy cattle, state of sickness, Feed and daily water consumption, body condition scoring, normal temperature, respiration and signs of ill health • Discuss cattle reproduction management: age of reproductive maturity, signs of heat, mating, gestation period and calving management		floor space, ventilation, shade and access to pasture • Observe and document the feeds types, texture, odour, water sources, general behaviour and general sanitation wellbeing • Measure and record the weight of a calf using a weighingscale • Record date, age and weight	conditions of cattle on a farm: floor space, ventilation, shade and access to pasture • Observe and document the feeds types, texture, odour, water sources, general behaviour and general sanitation wellbeing • Measure and record the weight of a calf using a weighingscale • Record date, age and weight	
General Objective 3.0: Know the management of sheep and goats in organic farming systems						
5 – 6	3.1 Describe common sheep and goat breeds kept in Nigeria 3.2 Explain housing requirements for sheep and goats in organic systems 3.3 Describe feeding of sheep	• Describe common sheep and goat breeds kept in Nigeria: Yankasa, Uda, West African Dwarf goat, Red	Sheep and goat breed photographs, housing diagram, reproductive	• Identify sheep and goat breeds on the college farm or nearby farm • Record breed name	Guide students to: • Identify sheep and goat breeds on the college farm or nearby farm	College/Nearby sheep or goat farm, health check recording form, feed ration template,

	and goats in organic systems 3.4 Explain reproduction management in sheep and goats 3.5 Describe state of wellbeing: temperature range, diseases resistance, etc 3.6 Describe common health problems of sheep and goats and their organic management, internal parasites, foot rot, respiratory infections, etc	Sokoto goat, etc • Discuss housing requirements for sheep and goats in organic systems: pen space, ventilation and access to browse and pasture • Explain feeding of sheep and goats in organic systems: browse, pasture, hay, mineral supplementation, etc. • Discuss reproduction management in sheep and goats: age of maturity, signs of heat, mating, gestation and kidding or lambing management • Describe state of wellbeing: temperature range, diseases resistance, etc • Discuss common health problems of sheep and goats and their organic management, internal parasites, foot rot, respiratory	cycle chart, health management guide, projector, marker board, videos, etc.	and key characteristics • Record the feeding and housing conditions of sheep or goats in an organic farm • Carry out a basic health check on three small ruminants: check eyes, coat, body condition and hooves; record observations • Prepare a simple daily feed ration for five goats based on available organic feed materials	• Record breed name and key characteristics • Record the feeding and housing conditions of sheep or goats in an organic farm • Carry out a basic health check on three small ruminants: check eyes, coat, body condition and hooves; record observations • Prepare a simple daily feed ration for five goats based on available organic feed materials	field notebooks, PPE, smartphones, transport, etc.
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		infections, etc				
General Objective 4.0: Know the management of pigs in organic farming systems						
7 – 8	4.1 Describe pig breeds suitable for organic production in Nigeria: Large White, Landrace, West African Dwarf pig, etc. 4.2 Explain housing requirements for pigs in organic systems: floor space, wallowing area, shade and rooting material 4.3 Describe feeding of pigs in organic systems: kitchen waste, crop by-products, pasture access and organic concentrate 4.4 Explain reproduction management in pigs: signs of heat, mating, gestation period and farrowing management 4.5 Describe state of wellbeing: basic health management of pigs in organic systems: common diseases, hygiene, biosecurity and prohibited treatments	• Describe pig breeds using photographs and production data • Explain organic pig housing requirements with diagrams • Describe feeding options for organic pigs with Nigerian examples • Explain reproduction management using a pig reproductive cycle chart • Describe health management and biosecurity for organic pigs	Pig breed photographs, housing design diagram, reproductive cycle chart, biosecurity guide, projector, marker board, videos, etc.	• Observe the housing conditions of pigs on the college farm or nearby farm: floor space, wallowing area, shade and hygiene • Prepare a daily feed ration for five pigs using available organic feed materials • Record signs of health and welfare in pigs: body condition, skin condition, behaviour and mobility • Carry out basic cleaning and disinfection of a pig pen using allowed organic disinfectants. • Record procedure and materials used	Guide students to: • Observe the housing conditions of pigs on the college farm or nearby farm: floor space, wallowing area, shade and hygiene • Prepare a daily feed ration for five pigs using available organic feed materials • Record signs of health and welfare in pigs: body condition, skin condition, behaviour and mobility • Carry out basic cleaning and disinfection of a pig pen using allowed organic disinfectants. • Record procedure and materials used	College farm pig unit or nearby pig farm, feed materials, organic disinfectants, recording forms, field notebooks, transport, PPE, smartphones, etc.
General Objective 5.0: Understand integrated crop-livestock farming systems in organic agriculture						
9 – 10	5.1 Define integrated crop-livestock farming 5.2 Explain integrated crop-	• Define integrated crop-livestock farming and explain	Integrated farming system	• Visit an integrated organic crop-livestock farm	Guide students to: • Visit an integrated organic crop-	Nearby integrated farm or

	livestock farming benefits in organic systems: manure for crops, crop residues for livestock, reduced input costs and improved farm income 5.3 Describe models of integrated crop-livestock systems practiced in Nigeria: mixed farming, zero-grazing and cut-and-carry systems 5.4 Explain how livestock manure is collected, composted and applied in an integrated organic farm 5.5 Describe how crop residues and by-products are used as livestock feed in integrated organic farms 5.6 Explain the role of integration in improving farm resilience and sustainability	benefits with Nigerian examples • Describe each integration model with farm diagrams • Explain manure collection, composting and application in an integrated farm • Describe use of crop residues as feed with examples of common Nigerian crop by-products • Discuss farm resilience and sustainability benefits of integration	diagram, manure management guide, crop residue feed value table, projector, marker board, etc.	• Draw a sketch map showing how crops and livestock are arranged. • Record how manure flows from livestock to crops • Carry out collection and weighing of livestock manure from the college farm for one day • Record species, quantity collected and plan for composting • Identify five crop residues available on the college farm; • Record the crop, residue type and suitability as livestock feed • Design a simple integrated farming layout for a 1-hectare farm showing crop plots, livestock unit, compost area and manure flow	livestock farm • Draw a sketch map showing how crops and livestock are arranged. • Record how manure flows from livestock to crops • Carry out collection and weighing of livestock manure from the college farm for one day • Record species, quantity collected and plan for composting • Identify five crop residues available on the college farm; • Record the crop, residue type and suitability as livestock feed • Design a simple integrated farming layout for a 1-hectare farm showing crop plots, livestock unit, compost area and manure flow	college farm, sketch map template, weighing scale, manure collection containers, farm layout design template, field notebooks, smartphones, PPE, transport, etc.
General Objective 6.0: Understand organic animal nutrition and feeding practices						

11 – 12	6.1 Explain the nutritional requirements of livestock: energy, protein, minerals, vitamins and water 6.2 Describe allowed feed ingredients in certified organic livestock production 6.3 Describe prohibited feed ingredients in certified organic livestock production: synthetic growth promoters, animal meal in ruminants, GMO feeds, etc. 6.4 Explain how to formulate a simple organic feed ration using locally available ingredients 6.5 Describe pasture and fodder management for organic livestock: establishment, rotational grazing and conservation as hay or silage 6.6 Explain feeding practices for fattening and lactation	• Explain livestock nutritional requirements using a simple nutrient requirement table • Describe allowed and prohibited feed ingredients using the Nigerian Organic Agriculture Standard • Discuss simple ration formulation using locally available feed ingredients • Explain pasture management and fodder conservation methods • Discuss feeding practices for fattening and lactation	Livestock nutrient requirement table, Nigerian Organic Agriculture Standard, feed ingredient list, ration formulation guide, projector, marker board, etc.	• Identify feed ingredients available on or near the college farm. • Classify each as allowed or prohibited in organic livestock production • Formulate a simple daily ration for one cattle or five goats using locally available organic feed ingredients • Record ingredients, quantities and estimated nutrient content • Identify evidence of pest in the storage vicinity • Establish a small fodder plot on the college farm using elephant grass, guinea grass or lablab • Record planting date, spacing and germination rate • Prepare hay from available grass on the college farm: cut, dry and bundle	Guide students to: • Identify feed ingredients available on or near the college farm. • Classify each as allowed or prohibited in organic livestock production • Formulate a simple daily ration for one cattle or five goats using locally available organic feed ingredients • Record ingredients, quantities and estimated nutrient content • Identify evidence of pest in the storage vicinity • Establish a small fodder plot on the college farm using elephant grass, guinea grass or lablab • Record planting date, spacing and germination rate • Prepare hay from available grass on the college farm: cut, dry	Available feed ingredients on the farm, ration formulation template, fodder seeds, cutting tools, weighing scale, field notebooks, etc.
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				Record quantity produced and storage method	and bundle Record quantity produced and storage method	
General Objective 7.0: Understand health and welfare management in organic livestock systems						
13 – 15	7.1 Explain the principles of health management in organic livestock: prevention first, natural treatments preferred, conditional use of conventional medicine following approved standard 7.2 Describe preventive health management practices: good nutrition, clean housing, rotational grazing, vaccination and biosecurity 7.3 Describe allowed treatments in certified organic livestock production: herbal remedies, homeopathy and approved veterinary medicines where necessary 7.4 Explain the Five Freedoms of animal welfare and how they apply to organic livestock management 7.5 Describe the record-keeping requirements for organic livestock health and welfare management 7.6 Explain animal diseases control act on animal welfare and cruelty to animals in	- Explain organic health management principles using the Nigerian Organic Agriculture Standard - Describe preventive health practices with examples from Nigerian organic farms - Explain allowed treatments and the rule on withholding periods when conventional medicine is used, principle of residue on coloration, resistance and treatment failures - Explain the Five Freedoms and relate each to a practical management decision on the farm - Describe health and	Nigerian Organic Agriculture Standard, Five Freedoms chart, health management guide, record-keeping template, projector, marker board, videos, etc.	- Categorize apparently healthy and sick animal, practice the art of taking temperature for large population, and ages, description of dungs to nature of feeds and types - Visit livestock markets and abattoirs to carry out slaughtering techniques, meat inspection, waste disposal, consumers preference, etc - Carry out a welfare assessment on livestock on the college farm using the Five Freedoms as a checklist - Record score for each freedom and recommend one improvement - Observe the biosecurity measures	Guide students to: - Categorize apparently healthy and sick animal, practice the art of taking temperature for large population, and ages, description of dungs to nature of feeds and types - Visit livestock markets and abattoirs to carry out slaughtering techniques, meat inspection, waste disposal, consumers preference, etc - Carry out a welfare assessment on livestock on the college farm using the Five Freedoms as a checklist - Record score for each freedom and recommend one improvement	Five Freedoms welfare checklist, biosecurity observation form, health calendar template, farm logbook template, drone or drone footage, field notebooks, transport, PPE, smartphones, abattoir, livestock markets, etc.

	Nigeria to promote organic farming 7.7 Explain the statute provision in Nigeria on animal welfare on food safety and action against cruelty	welfare record-keeping requirements for organic certification • Discuss animal diseases control act on animal welfare and cruelty to animals in Nigeria to promote organic farming • Discuss the statute provision in Nigeria on animal welfare on food safety and action against cruelty		in place on a livestock farm: footbath, visitor control, quarantine area and feed storage; note any gap • Prepare a health and welfare management calendar for one livestock species for one year: include vaccination, deworming, housing cleaning, pasture rotation dates, etc. • Record all livestock health and feeding activities in a farm logbook for one week. • Review the logbook entry and check it meets basic organic certification record-keeping requirements • Use a drone or drone video footage to assess the condition of pasture and livestock grazing areas from above • Identify overgrazed or bare patches and recommend corrective management	• Observe the biosecurity measures in place on a livestock farm: footbath, visitor control, quarantine area and feed storage; note any gap • Prepare a health and welfare management calendar for one livestock species for one year: include vaccination, deworming, housing cleaning, pasture rotation dates, etc. • Record all livestock health and feeding activities in a farm logbook for one week • Review the logbook entry and check it meets basic organic certification record-keeping requirements • Use a drone or drone video footage to assess the condition of pasture and livestock grazing areas from above • Identify overgrazed or bare patches and	
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					recommend corrective management	
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Course Assessment:**Course work: 10%****Test/Assignments: 10%****Practical: 40%****Examination : 40%****Total = 100%**

ORGANIC BEEKEEPING AND MICRO-LIVESTOCK PRODUCTION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC BEEKEEPING AND MICRO-LIVESTOCK PRODUCTION	COURSE CODE: OAT 122	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 knowledge and practical-skills in organic beekeeping, snail farming, grasshopper rearing and rabbit production as income-generating and micro-livestock enterprises in organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the importance and principles of organic beekeeping;
- 2.0 Understand how to establish and manage an organic bee colony;
- 3.0 Know how to harvest and process organic honey and bee products;
- 4.0 Understand organic snail farming and its management;
- 5.0 Understand rabbit production in organic farming systems;
- 6.0 Know the production and management of other micro-livestock: grasshoppers and crickets;
- 7.0 Know record keeping and marketing of organic micro-livestock products.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC BEEKEEPING AND MICRO-LIVESTOCK PRODUCTION YEAR: I SEMESTER: II	COURSE CODE: OAT 122	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
	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 organic beekeeping, snail farming, grasshopper rearing and rabbit production as income-generating and micro-livestock enterprises in organic farming systems.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the importance and principles of organic beekeeping

1 – 2	1.1 Explain the importance of beekeeping in Nigeria: honey production, pollination services and income generation 1.2 Describe the biology of the honeybee: colony structure (queen, workers, drones), life cycle and communication 1.3 Explain the principles of organic beekeeping: no synthetic chemicals in hives, natural beeswax foundation, access to organic forage and prohibition	• Discuss the importance of beekeeping with reference to production data in Nigeria • Discuss bee colony structure and life cycle using a diagram • Describe organic beekeeping principles using the Nigerian Organic Agriculture Standard • Explain hive types with photographs and explain advantages and	Bee colony structure diagram, hive type photographs, beekeeping equipment display, protective clothing, Nigerian Organic Agriculture Standard, projector, marker board, Videos, etc.	• Identify all beekeeping equipment. • Handle all beekeeping equipment: hive tool, smoker, bee brush, honey extractor and protective suit. • Record the name and function of each item • Visit a beehive on the college or nearby farm. • Observe the colony with protective clothing • Record hive type, estimated colony size, brood condition and honey stores • Construct a simple	Guide students to: • Identify all beekeeping equipment. • Handle all beekeeping equipment: hive tool, smoker, bee brush, honey extractor and protective suit; record the name and function of each item • Visit a beehive on the college or nearby farm • Observe the colony with protective clothing • Record hive type, estimated colony size, brood condition and	Beekeeping equipment set, protective suits and gloves, smoker, timber and tools for hive construction, nearby beehive, field notebooks, , smartphones, etc.
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	of antibiotic treatment of colonies 1.4 Describe the types of beehives used in Nigeria: log hive, Kenya Top Bar Hive (KTBH) and Langstroth hive 1.5 Describe the equipment and protective clothing required for organic beekeeping	disadvantage of each for organic production • Display and explain beekeeping equipment and protective clothing		Kenya Top Bar Hive using locally available timber • Record materials used and dimensions • Light and operate a smoker correctly • Demonstrate its use to calm a bee colony during inspection • Keep all activities record	honey stores • Construct a simple Kenya Top Bar Hive using locally available timber • Record materials used and dimensions • Light and operate a smoker correctly • Demonstrate its use to calm a bee colony during inspection • Keep all activities record	
General Objective 2.0: Understand how to establish and manage an organic bee colony						
3 – 5	2.1 Explain how to site a beehive: shade, water source, flight path, distance from human activity and proximity to organic forage 2.2 Describe how to establish a new colony: bait hive method, swarm capture and package bee installation 2.3 Explain routine hive inspection: frequency, procedure, signs of a healthy colony and signs of problems	• Explain hive siting requirements with a site selection diagram • Describe colony establishment methods with emphasis on the bait hive method common in Nigeria • Describe routine hive inspection procedure using a step-by-step guide • Describe common pests and diseases and their organic	Hive siting diagram, inspection procedure guide, pest and disease photographs, seasonal management calendar, projector, marker board, videos, etc.	• Select a suitable site for a beehive on the college farm • Prepare a suitable site for a beehive on the college farm: record reasons for site selection, shade conditions, nearby forage plants and distance from human activity • Set up a bait hive using natural attractants: old beeswax or lemongrass oil • Record location, setup	Guide students to: • Select a suitable site for a beehive on the college farm • Prepare a suitable site for a beehive on the college farm: record reasons for site selection, shade conditions, nearby forage plants and distance from human activity • Set up a bait hive using natural attractants: old beeswax or	Beehive and equipment, protective suits, bait hive materials, beeswax or lemongrass oil, inspection recording form, field notebooks, smartphones, etc.

	2.4 Describe common bee pests and diseases in Nigeria: wax moth, small hive beetle, American foulbrood and their organic management 2.5 Explain seasonal management of bee colonies in Nigeria: dry season feeding, wet season honey flow and swarming management	management options • Explain seasonal colony management with a seasonal management calendar		date and check for occupation after two weeks • Carry out a routine hive inspection with full protective clothing • Record queen presence or evidence, brood pattern, honey stores, pest presence and colony temperament • Identify wax moth damage in an affected hive • Remove and destroy wax moth larvae and cocoons • Record findings and corrective actions taken	lemongrass oil • Record location, setup date and check for occupation after two weeks • Carry out a routine hive inspection with full protective clothing • Record queen presence or evidence, brood pattern, honey stores, pest presence and colony temperament • Identify wax moth damage in an affected hive • Remove and destroy wax moth larvae and cocoons • Record findings and corrective actions taken	
General Objective 3.0: Know how to harvest and process organic honey and bee products						
6 – 7	3.1 Explain the signs that honey is ready for harvest: capped honeycomb, low moisture content 3.2 Describe the honey harvesting process: uncapping, extraction,	• Explain signs of harvest-ready honey and demonstrate moisture measurement • Describe the honey harvesting process with photographs of	Honey harvesting equipment, refractometer for moisture testing, honey quality standard guide,	• Harvest honey from an established hive on the college farm: uncap honeycomb, extract honey using a manual extractor, strain and collect into clean containers	Guide students to: • Harvest honey from an established hive on the college farm: uncap honeycomb, extract honey using a manual extractor, strain and collect into clean	Established beehive, honey extractor, uncapping knife, strainer, clean jars, refractometer, beeswax moulds,

	straining and bottling 3.3 Explain organic honey quality standards: moisture content below 20%, absence of chemical residues and proper labelling 3.4 Describe other bee products and their uses: beeswax, propolis and pollen 3.5 Explain how to package and label organic honey for local market sale	each step • Explain organic honey quality standards and labelling requirements • Describe beeswax and propolis production and uses • Explain packaging and labelling requirements for local market	packaging materials, label samples, projector, marker board, etc.	• Record quantity harvested • Test the moisture content of harvested honey using a refractometer • Record the result and compare with the organic standard of below 20% • Process beeswax from harvested capping: melt, filter and pour into moulds; • Package 250g of harvested honey into a clean jar • Label with product name, farm name, harvest date, net weight and organic claim • Prepare for market display • Keep all activities record	containers • Record quantity harvested • Test the moisture content of harvested honey using a refractometer • Record the result and compare with the organic standard of below 20% • Process beeswax from harvested capping: melt, filter and pour into moulds; • Package 250g of harvested honey into a clean jar • Label with product name, farm name, harvest date, net weight and organic claim • Prepare for market display • Keep all activities record	packaging materials, label template, PPE, etc.
General Objective 4.0: Understand organic snail farming and its management						
8 – 9	4.1 Explain the importance of snail farming in Nigeria: protein source, income	• Explain snail farming importance with Nigerian production and	Snail species photographs, housing design diagrams, snail	• Construct a simple snail hutch box using timber and wire mesh	Guide students to: • Construct a simple snail hutch box using	Timber, wire mesh, tools for hutch construction,

	generation and low input requirement 4.2 Describe common snail species farmed in Nigeria: <i>Archachatina marginata</i> and <i>Achatina achatina</i> 4.3 Explain housing requirements for organic snail farming: hutch box, trench pen and free-range system 4.4 Describe feeding of snails in organic systems: leaves, vegetables, fruit peels and calcium sources 4.5 Describe snail reproduction and growth management: egg laying, hatching, juvenile care and harvesting at market size	market data - Describe snail species using photographs and distinguish key characteristics - Explain housing systems with diagrams of hutch box and trench pen - Describe organic snail feeding using locally available feed materials - Explain reproduction and growth stages using a snail life cycle diagram	life cycle diagram, organic feed material list, projector, videos, marker board, etc.	- Record materials used and dimensions - Stock the hutch box with ten snails - Record species, initial weight and stocking density - Prepare and offer an organic feed ration to the snails: leaves, fruit peels and crushed eggshell - Record feed type, quantity and feeding response after 24 hours - Observe snail growth and behaviour over two weeks - Measure shell length and body weight at weeks 1 and 2 - Record observation	timber and wire mesh - Record materials used and dimensions - Stock the hutch box with ten snails - Record species, initial weight and stocking density - Prepare and offer an organic feed ration to the snails: leaves, fruit peels and crushed eggshell - Record feed type, quantity and feeding response after 24 hours - Observe snail growth and behaviour over two weeks - Measure shell length and body weight at weeks 1 and 2 - Record observation	snails for stocking, organic feed materials, PPE, smartphones, weighing scale, measuring tape, field notebooks, etc.
General Objective 5.0: Understand rabbit production in organic farming systems						
10-11	5.1 Explain the importance of rabbit farming in Nigeria: fast growth, high protein meat, low feed cost and urban suitability	- Explain rabbit farming importance with Nigerian market data - Describe rabbit breeds using	Rabbit breed photographs, cage design diagram, reproductive cycle chart, organic feed	- Identify rabbit breeds on the college farm or nearby farm - Observe the housing conditions of rabbits: cage dimensions,	Guide students to: - Identify rabbit breeds on the college farm or nearby farm - Observe the housing conditions of rabbits:	College farm rabbit unit or nearby rabbit farm, cage assessment form, organic feed materials, health

	5.2 Describe common rabbit breeds kept in Nigeria: New Zealand White, Californian and local breeds 5.3 Explain housing requirements for organic rabbit production: cage design, space, ventilation and hygiene 5.4 Describe organic rabbit feeding: green forage, vegetables, hay and limited concentrate supplementation 5.5 Explain rabbit reproduction: signs of heat, mating, gestation period, kindling and care of young 5.6 Explain disease and management practice in Rabbit farming	photographs and production characteristics • Explain organic housing requirements with cage design diagrams • Describe organic feeding using locally available green forage and vegetable materials • Explain reproduction management using a rabbit reproductive cycle chart	material list, projector, marker board, videos, etc.	ventilation, hygiene and feeding equipment • Record the housing conditions of rabbits • Prepare and offer an organic feed ration of green forage and vegetables to five rabbits • Carry out a basic health check on three rabbits: check eyes, ears, coat and body condition. • Keep all activities record (breed name, coat colour, key characteristics, type of feed, etc)	cage dimensions, ventilation, hygiene and feeding equipment • Record the housing conditions of rabbits • Prepare and offer an organic feed ration of green forage and vegetables to five rabbits • Carry out a basic health check on three rabbits: check eyes, ears, coat and body condition. • Keep all activities record (breed name, coat colour, key characteristics, type of feed, etc)	check recording form, transport, PPE, etc.
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General Objective 6.0: Know the production and management of other micro-livestock: grasshoppers and crickets

12-13	6.1 Explain the importance of insect micro-livestock in Nigeria: protein source, low environmental impact, fast reproduction and	• Explain insect micro-livestock importance with Nigerian and global nutrition data • Describe the life	Insect life cycle diagrams, cricket rearing unit diagram, organic feed material list, insect product	• Set up a simple cricket rearing unit using a ventilated container • Add substrate, water source and feed • Stock with adult	Guide students to: • Set up a simple cricket rearing unit using a ventilated container • Add substrate, water source and feed	Ventilated containers, substrate material, adult crickets for stocking, organic feed materials, weighing scale,
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	growing market 6.2 Describe the biology and life cycle of edible grasshoppers and crickets 6.3 Explain housing and rearing requirements for crickets: container type, substrate, temperature, moisture and feed 6.4 Describe organic feed materials for cricket and grasshopper rearing: vegetable scraps, bran, leaf material and moisture sources 6.5 Explain harvesting, processing and marketing of edible insects in Nigeria	cycle of crickets and grasshoppers using diagrams • Explain cricket rearing requirements with a simple rearing unit diagram • Describe organic feed materials for insect rearing with local examples • Explain harvesting and processing methods including sun drying, roasting and packaging	photographs, projector, marker board, etc.	crickets; record setup date and initial population • Feed the cricket colony daily with organic vegetable scraps and bran • Observe population growth, moulting and egg laying over two weeks • Harvest mature crickets from the rearing unit • Sun dry or roast a sample • Weigh the final product and record the live-to-dried weight conversion ratio • Prepare a simple cost-benefit analysis for a 100-container cricket rearing unit: estimate feed cost, labour and expected income from dried cricket sales • Keep all activities record (setup date, population, moulting, egg laying, etc)	• Stock with adult crickets; record setup date and initial population • Feed the cricket colony daily with organic vegetable scraps and bran • Observe population growth, moulting and egg laying over two weeks • Harvest mature crickets from the rearing unit • Sun dry or roast a sample • Weigh the final product and record the live-to-dried weight conversion ratio • Prepare a simple cost-benefit analysis for a 100-container cricket rearing unit: estimate feed cost, labour and expected income from dried cricket sales • Keep all activities record (setup date, population, moulting, egg laying, etc)	drying tray, cost-benefit template, field notebooks, PPE, Smartphones, etc.
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General Objective 7.0: Know record keeping and marketing of organic micro-livestock products

14-15	7.1 Explain the importance of record keeping in organic micro-livestock production 7.2 Describe the records required in certified organic micro-livestock production: feed records, health records, production records and sales records 7.3 Explain basic marketing of organic micro-livestock products: pricing, packaging, labelling and identifying buyers 7.4 Describe how digital tools can support micro-livestock marketing: social media and simple farm records apps	• Explain record keeping importance and describe required records for organic certification • Describe each record type using sample completed forms • Explain product pricing, packaging and labelling with market examples • Describe WhatsApp Business setup for micro-livestock product marketing	Sample organic micro-livestock record forms, product label samples, WhatsApp Business guide, marketing guide, projector, marker board, etc.	• Complete a production record for one micro-livestock enterprise managed during this course: fill date, species, numbers, feed used, health observations and products harvested • Package and label a sample micro-livestock product (honey, dried snail or dried cricket): include product name, farm name, weight, date and organic claim • Create a WhatsApp Business product catalogue for one micro-livestock product: add product name, price, photograph and contact details • Prepare a simple one-page business plan for a micro-livestock enterprise of choice: include enterprise type, start-up cost, expected income and marketing plan	Guide students to: • Complete a production record for one micro-livestock enterprise managed during this course: fill date, species, numbers, feed used, health observations and products harvested • Package and label a sample micro-livestock product (honey, dried snail or dried cricket): include product name, farm name, weight, date and organic claim • Create a WhatsApp Business product catalogue for one micro-livestock product: add product name, price, photograph and contact details • Prepare a simple one-page business plan for a micro-livestock enterprise of choice: include enterprise type, start-up cost,	Production record templates, packaging materials, label templates, smartphones with WhatsApp Business, business plan template, field notebooks, etc.
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					expected income and marketing plan	
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COURSE ASSESSMENT:

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



ORGANIC HORTICULTURAL CROPS PRODUCTION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC HORTICULTURAL CROPS PRODUCTION	COURSE CODE: OAT 123	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 equipt students with the knowledge and practical skills to produce, manage and market organic horticultural crops including vegetables, fruits and spices.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the scope and importance of organic horticultural crop production in Nigeria;
- 2.0 -Understand land preparation and nursery management for organic horticultural crop production;
- 3.0 Understand how to manage organic vegetable production in the field;
- 4.0 Know how to manage organic fruit crop production;
- 5.0 Understand how to manage organic spices and condiments crop production;
- 6.0 Understand pest, disease and weed management in organic horticulture;
- 7.0 Know post-harvest handling and marketing of organic horticultural produce.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC HORTICULTURAL CROPS PRODUCTION	COURSE CODE: OAT 123	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK

COURSE SPECIFICATION: THEORETICAL AND PRACTICAL

GOAL: This course is designed to equip students with the knowledge and practical skills to produce, manage and market organic horticultural crops including vegetables, fruits and spices.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the scope and importance of organic horticultural crop production in Nigeria

1	1.1 Define horticulture 1.2 Explain its scope in organic agriculture in Nigeria 1.3 Explain the classification of horticultural crops: vegetables, fruits, spices, condiments, etc. 1.4 Explain the importance of producing horticultural crops in organic system: nutrition, income, export potential, etc. 1.5 Describe major horticultural crops produced in Nigeria	• Define horticulture and explain its scope with Nigerian production examples • Discuss the classification of horticultural crops using photographs and specimens • Discuss the importance of producing horticultural crops in organic system using market data and nutritional information	Nigeria agro-ecological zone map, horticultural crop photographs, market demand data, crop classification chart, projector, video, marker board, etc.	• Identify 15 horticultural crops from samples or photographs • Record crop name, type, growing zone and one market use for each • Visit a local market; identify horticultural produce in organic system • Record products, sellers and prices • Compare with conventional equivalents • Prepare a crop	Guide students to: • Identify 15 horticultural crops from samples or photographs; record crop name, type, growing zone and one market use for each • Visit a local market; identify horticultural produce in organic system • Record products, sellers and prices • Compare with conventional equivalents • Prepare a crop	Horticultural crop samples or photo cards, local market, price recording sheet, crop production calendar template, transport, etc.
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	and their growing zones 1.6 Describe the growing demand for vegetables and fruits in Nigerian urban markets	Describe major crops by zone using a Nigeria agro-ecological zone map		production calendar for at least three vegetable crops suited to the local ecological zone Record planting season, days to maturity and harvest window	production calendar for at least three vegetable crops suited to the local ecological zone Record planting season, days to maturity and harvest window	
General Objective 2.0: Understand land preparation and nursery management for organic horticultural crop production						
2 – 3	2.1 Describe land preparation requirements for organic horticultural crop production: raised beds, flat beds, sunken beds, container production, etc. 2.2 Explain soil amendment for organic horticultural production: compost, organic mulch and soil pH adjustment 2.3 Describe nursery establishment for transplanted horticultural crops: growing media, seed sowing, watering and hardening off 2.4 Explain transplanting	- Describe land preparation with diagrams of raised bed, sunken beds and flat bed designs - Explain soil amendment requirements with compost application rates for vegetables - Describe nursery management with photographs of organic vegetable nurseries - Explain transplanting and spacing for major crops	Raised bed, sunken beds and flat bed design diagrams, compost application rate guide, nursery management photographs, spacing guide for major vegetables, drip irrigation diagram, projector, video, marker board, etc.	- Prepare three raised beds of 1m x 5m on the college farm: incorporate compost, level surface and create drainage channels - Record steps and materials used - Set up an organic vegetable nursery with at least 50 seedlings: sow seeds in organic growing media, water daily, apply shade - Record germination weekly for three weeks - Transplant nursery seedlings to the field	Guide students to: - Prepare three raised beds of 1m x 5m on the college farm: incorporate compost, level surface and create drainage channels - Record steps and materials used - Set up an organic vegetable nursery with at least 50 seedlings: sow seeds in organic growing media, water daily, apply shade - Record germination weekly for three weeks - Transplant nursery seedlings to the field	Compost, hoes, measuring tape, nursery trays, organic growing media, vegetable seeds, watering cans, drip tape or perforated pipe, college farm plots, smartphones, PPE, etc.

	procedure and spacing for major vegetables 2.5 Describe drip and sprinkler irrigation setup for organic horticultural plots	Describe simple drip and sprinkler irrigation setups for smallholder horticultural plots		at the correct spacing - Record transplanting date, spacing and number of plants per plot - Set up a simple drip irrigation line for one vegetable bed - Record materials used and water flow rate	at the correct spacing - Record transplanting date, spacing and number of plants per plot - Set up a simple drip irrigation line for one vegetable bed - Record materials used and water flow rate	
General Objective 3.0: Understand how to manage organic vegetable production in the field						
4 – 6	3.1 Describe the production requirements of major organic vegetables in Nigeria: tomato, pepper, okra, onion, cabbage, carrot and amaranth 3.2 Explain organic soil fertility management for vegetables: compost, manure, foliar feeding and green manure 3.3 Describe irrigation management for organic vegetables: frequency, method and moisture monitoring 3.4 Explain training, staking and pruning of	- Describe production requirements of each vegetable using planting guides and photographs - Explain fertility management for vegetables with application rates and timing - Describe irrigation management with frequency guides for different vegetable types - Describe staking and pruning for tomato and climbing crops	Vegetable production guides, fertility management chart, irrigation frequency guide, stakes, pruning tools, staking and pruning photographs, crop monitoring chart, projector, video, marker board, etc.	- Establish plots of at least three vegetable crops on the college farm - Record planting date, spacing, seedbed type and irrigation method for each - Apply compost and foliar organic feed to established vegetable plots; record type, rate, method and date for each application - Monitor vegetable crops weekly for four weeks: record plant height, leaf colour, pest presence and any deficiency	Guide students to: - Establish plots of at least three vegetable crops on the college farm - Record planting date, spacing, seedbed type and irrigation method for each - Apply compost and foliar organic feed to established vegetable plots; record type, rate, method and date for each application - Monitor vegetable crops weekly for four weeks: record plant height, leaf colour, pest presence and any	Vegetable seedlings or seeds, compost, foliar organic feed, stakes, pruning knife or scissors, crop monitoring table template, drone or drone footage, farm sketch map, college farm plots, smartphones, PPE, etc.

	climbing vegetable crops 3.5 Describe crop monitoring for organic vegetables: growth stages, nutrient deficiency symptoms and harvest indicators	• Explain crop monitoring using growth stage charts and deficiency symptom photographs		symptoms • Stake and prune a tomato plot • Record staking method, materials used and any improvement in plant condition observed • Use drone or drone footage to assess the condition and coverage of vegetable plots from above • Annotate a farm map with observations	deficiency symptoms • Stake and prune a tomato plot; record staking method, materials used and any improvement in plant condition observed • Use drone or drone footage to assess the condition and coverage of vegetable plots from above • Annotate a farm map with observations	
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General Objective 4.0: Know how to manage organic fruit crop production

7 – 9	4.1 Describe major fruit crops produced in an organic system in Nigeria: mango, citrus, pawpaw, banana, pineapple and watermelon 4.2 Explain establishment of organic fruit orchards: site selection, spacing, planting pit preparation and mulching 4.3 Describe organic management of	• Describe major organic fruit crops production with photographs • Explain orchard establishment with planting pit diagram and spacing guide • Describe organic management of established orchards with seasonal management	Fruit crop production photographs, orchard planting diagram, organic orchard management calendar, fruit pest and disease photographs, maturity index chart, projector, video, marker board, etc.	• Visit an organic fruit farm or college farm orchard; observe and record establishment, management practices and crop condition; draw a sketch of the orchard layout • Prepare three planting pits for fruit trees on the college farm: dig to correct dimensions, incorporate compost	Guide students to: • Visit an organic fruit farm or college farm orchard; observe and record establishment, management practices and crop condition; draw a sketch of the orchard layout • Prepare three planting pits for fruit trees on the college farm: dig to correct dimensions, incorporate compost and plant a seedling	Nearby organic fruit farm or college farm orchard, orchard sketch template, spades, compost, fruit tree seedlings, pruning saw or secateurs, pest identification guide, smartphones, transport, field notebooks, PPE, etc.
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	established fruit orchards: pruning, fertilization, irrigation and weed management 4.4 Explain common pests and diseases of fruit crops and their organic management 4.5 Describe maturity indices and harvesting methods for major fruits in organic system	calendar • Explain pests and diseases of fruit crops with photographs and organic management options • Explain maturity indices and harvesting for major fruits		and plant a seedling • Record species, pit size, compost quantity and planting date • Carry out pruning on established fruit trees on the college farm • Record trees pruned, type of cut made and reason for each cut • Identify five pests or diseases on fruit crops on the college farm or nearby farm photograph each • Record crop affected, damage symptoms and organic control recommended • Keep record of all activities	• Record species, pit size, compost quantity and planting date • Carry out pruning on established fruit trees on the college farm; record trees pruned, type of cut made and reason for each cut • Identify five pests or diseases on fruit crops on the college farm or nearby farm photograph each • Record crop affected, damage symptoms and organic control recommended • Keep record of all activities	
General Objective 5.0: Understand how to manage organic spices and condiments crop production						
10 – 11	5.1 State major organic spice and condiment crops produced in Nigeria 5.2 Describe the production requirements of each spice crop: planting	• Describe major Nigerian organic spice crops with photographs and specimens • Describe production requirements for each crop using	Spice crop specimens and photographs, planting guides, Nigerian organic spice export data, processing photographs,	• Plant ginger or turmeric rhizomes on a 2m x 4m college farm plot: record planting depth, spacing, compost applied and planting date	Guide students to: • Plant ginger or turmeric rhizomes on a 2m x 4m college farm plot: record planting depth, spacing, compost applied and planting date	Ginger or turmeric rhizomes, hibiscus, moringa seeds or cuttings, compost, college farm plots, drying trays, weighing scale, market brief

	material, spacing, soil, irrigation, season, etc. 5.3 Explain organic soil fertility management for spice crops 5.4 Describe harvesting and primary processing of organic spices: washing, drying, grading, etc. 5.5 Explain the market potential and export opportunities for certified organic spices from Nigeria	simple planting guides • Explain organic fertility management for spice crops • Describe harvesting and processing with photographs of each step • Explain market potential using Nigerian organic spice export data	projector, video, marker board, etc.	• Plant moringa seeds or cuttings on a college farm plot • Record establishment rate and first leaf emergence after 2 weeks • Harvest and process a sample of an available spice crop: wash, sun dry and grade • Record fresh weight, dried weight and percentage moisture loss • Prepare a market brief for one Nigerian organic spice • Record domestic and export prices and estimated farmer income per kilogram	• Plant moringa seeds or cuttings on a college farm plot • Record establishment rate and first leaf emergence after 2 weeks • Harvest and process a sample of an available spice crop: wash, sun dry and grade • Record fresh weight, dried weight and percentage moisture loss • Prepare a market brief for one Nigerian organic spice • Record domestic and export prices and estimated farmer income per kilogram	template, smartphones, etc.
General Objective 6.0: -Understand pest, disease and weed management in organic horticulture						
12 – 13	6.1 List common pests and diseases of organic horticultural crops in Nigeria and describe their damage 6.2 Explain organic pest and disease	• Discuss common pests and diseases with crop photographs and specimens • Explain organic pest and disease	Horticultural pest and disease photographs, botanical pesticide guide, weed management diagrams, net	• Scout the vegetable plots established in General Objective (GO) 3 for pests and diseases; record pest name, crop affected, damage level and	Guide students to: • Scout the vegetable plots established in General Objective (GO) 3 for pests and diseases; record pest name, crop affected,	Scouting form, neem leaves, extraction equipment, calibrated knapsack sprayer, PPE, mulch

	management in horticulture: cultural practices, botanical pesticides and biological control 6.3 Describe weed management in organic horticultural plots: mulching, manual weeding, cover cropping, etc, 6.4 Explain the use of nets and physical barriers for pest exclusion in organic horticulture 6.5 Describe record keeping for pest, disease and weed management in certified organic horticultural production	management with Nigerian horticultural examples •Describe weed management methods specific to horticultural plots •Explain physical barrier use with net house and exclusion net photographs •Describe record keeping requirements for certified organic horticulture	house photographs, pest and disease record template, projector, video, marker board, etc.	recommended organic control for each finding •Prepare neem extract for a pest-infested vegetable plot •Apply neem extract to the pest-infested vegetable plot •Calibrate the sprayer before application; record details and assess pest numbers before and 7 days after •Apply mulch between rows in a vegetable plot •Record material used, depth applied and weed density compared with an unmulched row after two weeks •Complete a pest and disease management record for all control activities carried out on the college farm plots during this semester	damage level and recommended organic control for each finding •Prepare neem extract for a pest-infested vegetable plot •Apply neem extract to the pest-infested vegetable plot •Calibrate the sprayer before application; record details and assess pest numbers before and 7 days after •Apply mulch between rows in a vegetable plot •Record material used, depth applied and weed density compared with an unmulched row after two weeks •Complete a pest and disease management record for all control activities carried out on the college farm plots during this semester	materials, pest management record template, weighing scale, field notebooks, smartphones, etc.
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General Objective 7.0: Know post-harvest handling and marketing of organic horticultural produce

14 – 15	7.1 Explain post-harvest losses in organic horticultural crops and their causes 7.2 Describe post-harvest handling of organic vegetables and fruits: cooling, sorting, grading, packaging, etc. 7.3 Explain storage methods for organic horticultural produce: ambient storage, cool store and hermetic bags for dried products 7.4 Describe marketing of organic horticultural produce: direct sales, farmers' markets, supermarkets and online platforms 7.5 Explain record keeping for organic horticultural post-harvest operations	• Explain post-harvest losses with Nigerian horticultural loss data • Describe post-harvest handling steps with photographs of each operation • Explain storage methods with photographs of compliant storage facilities • Describe marketing channels with examples of Nigerian organic vegetable and fruit sellers • Explain record keeping requirements for certified organic post-harvest operations	Nigerian horticultural post-harvest loss data, post-harvest handling photographs, storage method photographs, marketing channel guide, post-harvest record template, projector, video, marker board, etc.	• Harvest vegetables from the college farm plots • Sort and grade into quality grades • Record grading criteria and percentage in each grade • Package graded organic vegetables using appropriate materials • Label each package with crop name, weight, harvest date, farm name and organic claim • Set up a simple cool store for fresh organic vegetables • Record temperature inside and outside the store • Compare produce condition after 3 days • Create a WhatsApp Business catalogue for two organic horticultural products	Guide students to: • Harvest vegetables from the college farm plots • Sort and grade into quality grades • Record grading criteria and percentage in each grade • Package graded organic vegetables using appropriate materials • Label each package with crop name, weight, harvest date, farm name and organic claim • Set up a simple cool store for fresh organic vegetables • Record temperature inside and outside the store • Compare produce condition after 3 days • Create a WhatsApp Business catalogue for two organic horticultural products from the college farm:	College farm vegetable plots, grading bins, packaging materials, label template, cool store materials, thermometer, smartphones with WhatsApp Business, post-harvest record template, PPE, field notebooks, etc.
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				from the college farm: add product name, price, photograph and contact details • Complete a post-harvest record for all produce handled during this semester	add product name, price, photograph and contact details • Complete a post-harvest record for all produce handled during this semester	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

STANDARDS AND CERTIFICATION IN ORGANIC AGRICULTURE

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: STANDARDS AND CERTIFICATION IN ORGANIC AGRICULTURE	COURSE CODE: OAT 124	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 knowledge and practical skills to understand organic certification systems, prepare basic certification documentation and assist farmers in meeting organic certification requirements.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the concept and importance of organic certification;
- 2.0 Know the major organic standards and their key requirements;
- 3.0 Understand Participatory Guarantee Systems as an alternative to third-party certification
- 4.0 Understand the organic certification process;
- 5.0 Know how to apply organic farm documentation and record keeping for certification;
- 6.0 Know how to assist a farmer in preparing for an organic certification inspection.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: STANDARDS & CERTIFICATION IN ORGANIC AGRICULTURE	COURSE CODE: OAT 124	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK

COURSE SPECIFICATION: THEORETICAL AND PRACTICAL

GOAL: This course is designed to equip students with the knowledge and practical skills to understand organic certification systems, prepare basic certification documentation and assist farmers in meeting organic certification requirements.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the concept and importance of organic certification

1 – 2	1.1 Define organic certification 1.2 Explain the purpose of organic certification: consumer assurance, market access and price premium 1.3 List the type of certification in organic agriculture (Self acclaim, Participatory Guarantee System and Third Party) 1.4 Explain the difference between certified and uncertified organic produce and why	• Explain organic certification and its purpose with Nigerian market examples • Describe the various type of certification in organic agriculture • Explain the difference between certified and uncertified organic produce • Describe the parties involved using an organic certification value	, Nigeria Organic Agric. Standards, NOP, EU, JAS and BIO Swiss Standards, Pictures of organic certificates, projector, marker board, videos, etc.	• Visit or virtually connect with a certified organic farmer • Present summary of field visit to the class • Examine five certified organic products from the market with record the certifying body, certification mark, country of origin and price premium compared with the uncertified equivalent • Prepare a simple cost-benefit table for organic certification for a 2-hectare smallholder farm: estimate certification cost and price premium	Guide students to: • Visit or virtually connect with a certified organic farmer • Present summary of field visit to the class • Examine five certified organic products from the market with record the certifying body, certification mark, country of origin and price premium compared with the uncertified equivalent • Prepare a simple cost-benefit table for	Certified organic products, certified farm, or smartphone, internet, cost-benefit table template, field notebooks, transport, etc.
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	certification matters for export and premium markets 1.5 Describe the parties involved in organic certification: farmer, certification body, accreditation body and buyer 1.6 Explain the cost and time requirements of organic certification for a smallholder farmer in Nigeria 1.7 Describe the benefits of organic certification for farmers: price premium, market access, improved farm management and international recognition	chain diagram • Discuss the cost and time requirements for smallholder certification in Nigeria • Explain certification benefits using documented case studies of Nigerian certified farmers		income and determine the break-even timeline • Keep records of all activities.	organic certification for a 2-hectare smallholder farm: estimate certification cost and price premium income and determine the break-even timeline • Keep records of all activities.	
General Objective 2.0: Know the major organic standards and their key requirements						
3 – 5	2.1 Describe the Nigeria Organic Agriculture Standard (NOAS) and its key requirements for crop production, livestock and post-harvest handling 2.2 State major	• Explain the NOAS highlighting key requirements for each production area • Describe the requirements of NOAS with other global standards	Nigerian Organic Agriculture Standard document, EU/JAS/NOP/Bio-Swiss Organic Regulations, IFOAM Basic Standards overview, organic	• Identify the most important requirements a farmer must meet ((crop and animal production) • Identify three similarities and key differences among the different standards • Prepare a conversion plan	Guide students to: • Identify the most important requirements a farmer must meet ((crop and animal production) • Identify three similarities and key differences among the	NOAS document, EU Organic Regulation summary chart, conversion plan template, farm input list for classification, smartphone, field

	requirements of NOAS with other global standards (EU, NOP, JAS, Bio-Swiss, etc). 2.3 Describe the IFOAM Basic Standards and their role as an international framework for organic certification 2.4 Explain the conversion period requirement: definition, duration (typically 2–3 years in crop) and what is required during conversion 2.5 Describe the prohibited inputs in organic production: synthetic fertilizers, synthetic pesticides, GMOs, antibiotics, synthetic growth promoters, etc	(EU, NOP, JAS, Bio-Swiss, etc) • Discuss EU Organic Regulation requirements at awareness level using a simple summary chart • Explain IFOAM Basic Standards and their relationship to national standards • Explain the conversion period and what farmers must do and avoid during conversion • Explain prohibited inputs using the NOAS and compare with EU requirements	labels, prohibited inputs list, projector, videos, marker board, etc.	for a fictional 1-hectare conventional farm transitioning to organic: • Prepare a conversion plan for animal farm; poultry, cattle, sheep, goat, • Identify ten products in a college farm input store classify each as allowed, prohibited or allowed with conditions under the NOAS	different standards • Prepare a conversion plan for a fictional 1-hectare conventional farm transitioning to organic: • Prepare a conversion plan for animal farm; poultry, cattle, sheep, goat, • Identify ten products in a college farm input store classify each as allowed, prohibited or allowed with conditions under the NOAS	notebooks, transport, etc.
General Objective 3.0: Understand Participatory Guarantee Systems as an alternative to third-party certification						
6 – 8	3.1 Define Participatory Guarantee Systems (PGS) and third-party certification 3.2 Explain the principles	• Explain PGS and third-party certification using a comparison table • Explain PGS	PGS vs third-party certification comparison table, PGS organisational	• Create preservation slides on PGS and third-party certification using a structured comparison table: cost, time, scale,	Guide students to: • Create preservation slides on PGS and third-party certification using a	PGS vs third-party comparison table template, PGS group design template,

	of PGS: participatory inspection, shared responsibility, local markets focus, low cost, etc. 3.3 Describe how a PGS group is organised: membership, peer inspection system, decision-making and record keeping 3.4 Explain the advantages and limitations of PGS for smallholder farmers in Nigeria 3.5 Describe existing PGS groups in Nigeria and their experiences	principles using examples from Nigeria and other vibrant PGS system globally • Describe PGS group organisation using an organisational diagram • Discuss advantages and limitations of PGS for Nigerian smallholder actors • Describe Profile of existing PGS groups using NOAN and IFOAM resources	diagram, example of organic certificate, Nigerian PGS group profiles, IFOAM PGS guidelines, projector, marker board, videos, etc.	market access and suitability for smallholder farmers in Nigeria for each system • Demonstrate a simple PGS group structure for ten smallholder organic farmers in a village: specify how members will inspect each other, how decisions will be made and how records will be kept • Carry out PGS peer inspection in a role-play mode: one student plays the farmer being inspected, another plays the peer inspector • Use an inspection checklist • Interview a NOAN representative about PGS in Nigeria • Document key points and present summary report	structured comparison table: cost, time, scale, market access and suitability for smallholder farmers in Nigeria for each system • Demonstrate a simple PGS group structure for ten smallholder organic farmers in a village: specify how members will inspect each other, how decisions will be made and how records will be kept • Carry out PGS peer inspection in a role-play mode: one student plays the farmer being inspected, another plays the peer inspector • Use an inspection checklist • Interview a NOAN representative about PGS in Nigeria • Document key points	PGS peer inspection checklist, Field evaluation form, Farmers pledge, NOAN or EOA Initiative contact, field notebooks, smartphones, etc.
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					and present summary report	
General Objective 4.0: Understand the organic certification process						
9 - 11	4.1 Describe the steps in the organic certification process: application, review of application document, farm inspection, assessment, certification decision and annual renewal 4.2 Explain what happens during farm inspection for the different types of certification: what the inspector checks, what documents are needed, how the farmer should prepare, etc 4.3 State the national and international certification bodies and their contact details: 4.4 Explain the conditions that can lead to suspension or withdrawal of organic certification 4.5 Explain the certification renewal	• Describe the certification process step by step using a certification process flowchart • Describe the farm inspection procedures and what inspectors look for • Discuss/Profile certification bodies operating in Nigeria with their contact details and focus areas • Explain suspension and withdrawal conditions using case examples • Explain the annual renewal process and ongoing compliance obligations	Certification process flowchart, farm inspection checklist, certification body profile cards, projector, marker board, videos, etc.	• Prepare a farm inspection preparation checklist for a farmer about to undergo their first certification inspection: • Complete a mock organic certification application form for a fictional 2-hectare vegetable farm • Fill all required sections accurately • Conduct a mock farm inspection (PGS and Third party) on the college farm using a certification inspection checklist • Record findings for each checklist item and identify areas that need improvement before a real inspection • Research one certification body operating in Nigeria • Record their name, focus crops, certification cost estimate, inspection process and contact	Guide students to: • Prepare a farm inspection preparation checklist for a farmer about to undergo their first certification inspection: • Complete a mock organic certification application form for a fictional 2-hectare vegetable farm • Fill all required sections accurately • Conduct a mock farm inspection (PGS and Third party) on the college farm using a certification inspection checklist • Record findings for each checklist item and identify areas that need improvement before a real inspection • Research one	Mock organic certification application form, farm inspection checklist, inspection preparation checklist template, certification body profiles, computers with internet, PPE, smartphones, field notebooks, etc.

	process and ongoing compliance requirements			details	certification body operating in Nigeria	
					Record their name, focus crops, certification cost estimate, inspection process and contact details	

General Objective 5.0: Know how to apply organic farm documentation and record keeping for certification

12 - 13	5.1 Explain the importance of farm records in organic certification 5.2 Describe the records required for organic certification: farm map, field history, input purchase records, harvest records, storage records and sales records 5.3 Explain how to prepare a farm map for organic certification showing field boundaries, buffer zones, water sources and prohibited-use areas 5.4 Describe how to keep a field history record showing past crops,	- Explain importance of records in organic certification with examples of farms that lost certification due to poor records - Describe each required record type and walk through a completed sample of each - Explain farm map preparation requirements with a sample certified farm map - Explain field history records and walk through a completed example	Sample completed organic farm records, certified farm map example, field history record template, Google Sheets demonstration, projector, marker board, videos, etc.	- Prepare a farm map for the college farm: draw field boundaries, label each field, mark buffer zones, water sources, compost area and any prohibited-use areas; record area of each field - Complete a field history record for three fields on the college farm for the past two seasons: record crop planted, inputs used, yields and any prohibited substance applications - Set up a digital farm record using Google Sheets: create tabs for input purchases, harvest records and sales; enter at least five records in each tab - Complete a full set of organic certification	- Prepare a farm map for the college farm: draw field boundaries, label each field, mark buffer zones, water sources, compost area and any prohibited-use areas; record area of each field - Complete a field history record for three fields on the college farm for the past two seasons: record crop planted, inputs used, yields and any prohibited substance applications - Set up a digital farm record using Google Sheets: create tabs	Farm map template, field history record template, Google Sheets on smartphones or computers, certification record checklist, field notebooks, measuring tape, PPE, smartphones. etc.
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	inputs used and any prohibited substance application 5.5 Explain how digital tools can simplify organic farm record keeping: smartphone apps, Google Sheets and WhatsApp for record sharing with inspectors	Describe digital record keeping using Google Sheets on a smartphone		records for one crop grown on the college farm during this semester: include all required documents in a certification-ready folder	for input purchases, harvest records and sales; enter at least five records in each tab Complete a full set of organic certification records for one crop grown on the college farm during this semester: include all required documents in a certification-ready folder	
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General Objective 6.0: Know how to assist a farmer in preparing for an organic certification inspection

14 – 15	6.1 Explain the role of an organic farm technician in supporting farmers through the certification process 6.2 Describe how to develop Organic System plan (OSP) 6.3 Explain how to help a farmer organise and present their certification records 6.4 Describe common reasons why farms fail	- Explain the technician role in certification support with examples from Nigeria - Explain Organic System plan (OSP) development - Describe how to organise and present a farmer's certification records - Describe common inspection failure	Pre-inspection readiness assessment form, certification record organisation guide, common inspection failure checklist, drone or drone footage, projector, marker board, videos. etc.	- Carry out a full pre-inspection readiness assessment on the college farm using a structured checklist with score assigned to each item and identify gaps - Prepare a written action list for the farmer based on the assessment - Organise a mock certification record folder for the college farm: - Arrange all records prepared during this	Guide students to: - Carry out a full pre-inspection readiness assessment on the college farm using a structured checklist with score assigned to each item and identify gaps - Prepare a written action list for the farmer based on the assessment - Organise a mock certification record	Pre-inspection readiness assessment checklist, certification record folder, certification checklist, drone or drone footage, pre-inspection report template, field notebooks, PPE, smartphones, etc.
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	organic inspections and how to avoid them 6.5 Explain how to use a drone to document farm layout and field conditions as evidence for a certification inspection file	reasons with examples and corrective actions • Explain how drone imagery can document farm layout and buffer zones for the certification file		course into correct sections; check completeness against a certification checklist • Prepare a written pre-inspection report for the college farm: summarise the farm's readiness, • Identify three areas that require improvement and recommend specific actions for each • Use a drone or drone video footage to document the college farm layout from above: identify and label all fields, buffer zones, water sources and compost areas on the aerial image; include the image in the mock certification file • Present the completed mock certification file to the class	folder for the college farm: • Arrange all records prepared during this course into correct sections; check completeness against a certification checklist • Prepare a written pre-inspection report for the college farm: summarise the farm's readiness, • Identify three areas that require improvement and recommend specific actions for each • Use a drone or drone video footage to document the college farm layout from above: identify and label all fields, buffer zones, water sources and compost areas on the aerial image; include the image in the mock certification file • Present the completed mock	
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					certification file to the class	
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COURSE ASSESSMENT:

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



PRINCIPLES OF GENETICS, BREEDING IN ORGANIC AGRICULTURE

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF GENETICS, BREEDING IN ORGANIC AGRICULTURE	COURSE CODE: OAT 125	CONTACT HOURS: 2 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 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 (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: PRINCIPLES OF GENETICS, BREEDING AND BIOTECHNOLOGY IN AGRICULTURE			COURSE CODE: AGT 125		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: I 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.	• Discuss cell division stages using diagrams. • Explain the importance of Mitosis and Meiosis	Textbooks, Journals, Internet, Articles, 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 etc.
GENERAL OBJECTIVE 2.0: Know Mendelian laws of inheritance and their applications.						
3 - 4	2.1 Explain Mendel's First Law (Segregation).	• Discuss monohybrid crosses on the board.	Textbooks, Journals,	• Solve various genetic problems involving	Guide students to: • Solve various	Whiteboard, markers,

	2.2 Explain Mendel's Second Law (Independent Assortment). 2.3 Explain the use of Punnett squares for simple crosses.	Discuss dihybrid crosses on the board.	Internet, Articles, Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Crop samples, charts, worksheets. Software, etc.	monohybrid and dihybrid crosses using Punnett squares.	genetic problems involving monohybrid and dihybrid crosses using Punnett squares.	worksheets. worksheets. Projector Software, practical manual etc.
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.	- Discuss genes, alleles, and chromosomes using relatable examples (e.g., coat color in cattle or flower color). - Explain Dominance and Recessive genes. - Explain Incomplete Dominance and Co-dominance.	Textbooks, Journals, Internet, Articles, 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 etc.
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 Hybrid Vigour	- Explain how genes work together. - Describe high-yielding hybrids.	Textbooks, Journals, Internet, Articles,	Compare growth data of hybrids vs. local breeds.	Guide students to: Compare growth data of hybrids vs. local breeds.	Production records, growth charts, practical

	(Heterosis). 4.3 Explain why hybrids often perform better than parents.	Discuss why hybrids often perform better than parents.	Projector, Computer, Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Production records, growth charts, etc.			manual etc.
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 reproductive tracts using models. - Discuss factors like nutrition, environment, health etc. in relation to reproduction in plants and animals	Textbooks, Journals, Internet, Articles, 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 etc.
GENERAL OBJECTIVE 6.0: Understand the role of selection in agricultural improvement.						
11 - 12	6.1 Define Natural and Artificial Selection. 6.2 Explain traits for selection (growth rate, yield, disease resistance etc).	- Discuss "Survival of the fittest" and "Breeder's choice". - Explain traits for selection (growth rate, yield, disease	Textbooks, Journals, Internet, Articles, Projector, Computer,	- Carry out culling and selection of animals based on records. - Carry out rogueing and selection in crops	Guide students to: - Carry out culling and selection of animals based on records. - Carry out rogueing	Farm records, weighing scales, practical manual etc.

	6.3 Explain how to choose the best parents.	resistance etc). • Explain how to choose the best parents.	Diagrams/charts Marker board, Marker, Pictures, Videos Crop samples, charts Farm records, weighing scales, etc.		and selection in crops	
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	• Explain Inbreeding and its risks. • Explain Crossbreeding and its benefits. • Explain Linebreeding and Outbreeding. • Explain the Artificial Insemination Method in Livestock • Describe the pros and cons of each method for a farmer.	Textbooks, Journals, Internet, Articles, 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).	Guide students to: • 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 etc.
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 Explain basic techniques (e.g., tissue culture,	• Discuss concepts of genetic engineering and its benefits/concerns. • Explain agricultural biotechnology and its benefits • Discuss the basic	Textbooks, Journals, Internet, Articles, Projector, Computer, Diagrams/charts Marker board,	• Observe plant tissue culture setup • Identify case studies of GMOs • Write a report on a study visit to a tissue culture laboratory.	Guide students to • Observe plant tissue culture setup • Identify case studies of GMOs. • Organize a visit to a tissue culture lab.	Lab equipment photos, case studies, videos, practical manual etc.

	genetic modification) in agricultural biotechnology 8.4 Explain the applications of biotechnology in crops and livestock improvement. 8.5 Explain the challenges of agricultural Biotechnology	techniques (e.g., tissue culture, genetic modification) in agricultural biotechnology • Explain the applications of biotechnology in crops and livestock improvement. • Discuss the challenges of agricultural Biotechnology	Marker, Pictures, Videos Crop samples, charts Lab equipment, case studies	• Participate in a simple plant tissue culture setup (e.g., propagating a plant from a small explant).	• Participate in a simple plant tissue culture setup (e.g., propagating a plant from a small explant).	
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COURSE ASSESSMENT:

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

WATER MANAGEMENT IN ORGANIC FARMING**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: WATER MANAGEMENT IN ORGANIC FARMING	COURSE CODE: OAT 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 knowledge and practical skills to manage water resources efficiently and effectively in sustaining organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the importance of water in organic farming and sources of water on the farm;
- 2.0 Know water harvesting and storage techniques in organic farming;
- 3.0 Understand irrigation methods suitable for organic farming systems;
- 4.0 Understand water conservation practices in organic crop production;
- 5.0 Know how to assess and maintain water quality for organic farm use;
- 6.0 Understand digital tools for water management on organic farms.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: WATER MANAGEMENT IN ORGANIC FARMING				COURSE CODE: OAT 126		CONTACT HOURS: 3 HOURS/WEEK
				CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II				PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and practical skills to manage water resources efficiently and effectively in sustaining organic farming systems.						
	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand the importance of water in organic farming and sources of water on the farm						
1 – 2	1.1 Explain the importance of water in organic crop and livestock production 1.2 Describe the water cycle and explain how it affects farm water availability 1.3 List the sources of water available to organic farmers in Nigeria: rainfall, rivers, boreholes, wells and harvested runoff 1.4 Explain the water	• Explain the importance of water in organic farming with Nigerian farm examples • Describe the water cycle using a diagram • Discuss water sources available to farmers in different Nigerian ecological zones • Explain crop water requirements using a simple crop water requirement table • Explain SOM and	Water cycle diagram, crop water requirement table, Nigerian ecological zone water source map, projector, video, marker board, etc.	• Visit a water source on or near the college farm: record the type, estimated volume available, seasonal reliability and any water quality concerns observed • Measure and record rainfall using a simple rain gauge on the college farm for two weeks; calculate total rainfall and compare with the water requirement of one crop • Carry out a simple water infiltration test on two plots: pour 1 litre of water	Guide students to: • Visit a water source on or near the college farm: record the type, estimated volume available, seasonal reliability and any water quality concerns observed • Measure and record rainfall using a simple rain gauge on the college farm for two weeks; calculate total rainfall and compare with the	Rain gauge, ring infiltration equipment, farm map template, water source observation form, field notebooks, PPE, transport, etc.

	requirements of common organic crops grown in Nigeria 1.5 Explain the relationship between soil organic matter (SOM) and water retention on organic farms	water retention relationship using a comparison of soils with different SOM levels		into a ring - Record the time for complete infiltration - Compare results between an organically managed and a conventionally managed plot - Prepare a farm water source map for the college farm showing all water sources, their location and seasonal availability	water requirement of one crop - Carry out a simple water infiltration test on two plots: pour 1 litre of water into a ring; record the time for complete infiltration; compare results between an organically managed and a conventionally managed plot - Prepare a farm water source map for the college farm showing all water sources, their location and seasonal availability	
General Objective 2.0: Know water harvesting and storage techniques in organic farming						
3 – 5	2.1 Explain water harvesting as a climate-smart practice for organic farmers in semi-arid and sub-humid zones of Nigeria 2.2 Describe in-field water harvesting techniques: tied ridges, Zai pits, half-moon catchments, contour bunds, etc. 2.3 Describe water storage	- Explain water harvesting and its importance with rainfall variability data for Nigeria - Describe in-field techniques with construction diagrams - Describe storage structures with photographs and construction notes	In-field water harvesting technique diagrams, farm pond siting guide, storage structure photographs, roof catchment diagrams, projector, marker board, etc.	- Construct tied ridges on a 10m x 10m sloped plot on the college farm - Record ridge spacing, height and time taken - Measure soil moisture inside and outside ridges after the next rainfall - Dig three Zai pits in a bare or degraded area on the college farm	- Construct tied ridges on a 10m x 10m sloped plot on the college farm - Record ridge spacing, height and time taken - Measure soil moisture inside and outside ridges after the next rainfall - Dig three Zai pits in a	Hoes, pegs, measuring tape/tools, compost, crop seeds, guttering, storage drum, GPS smartphone app, farm sketch map template, field notebooks,

	structures used on organic farms: farm ponds, tanks, drums, roof catchment systems etc. 2.4 Explain how to site and maintain a farm pond for organic crop and livestock use 2.5 Describe roof water harvesting for domestic and farm use	• Explain farm pond siting and maintenance requirements • Describe roof catchment setup with a simple diagram		• Fill with compost; plant one seed per pit • Record germination and growth after 2 weeks • Set up a simple roof water harvesting system using available guttering and a storage drum; record catchment area, drum capacity and estimated water collected from one rainfall event • Use a GPS smartphone app to identify and record the coordinates of three suitable sites for water harvesting on the college farm • Plot them on a farm sketch map	bare or degraded area on the college farm • Fill with compost; plant one seed per pit • Record germination and growth after 2 weeks • Set up a simple roof water harvesting system using available guttering and a storage drum; record catchment area, drum capacity and estimated water collected from one rainfall event • Use a GPS smartphone app to identify and record the coordinates of three suitable sites for water harvesting on the college farm • Plot them on a farm sketch map	PPE, etc.
General Objective 3.0: Understand irrigation methods suitable for organic farming systems						
6 – 8	1.1 Explain the need for irrigation in organic	• Discuss need for irrigation with	Irrigation method	• Set up a simple drip irrigation line on a 5m	Guide students to: • Set up a simple drip	Drip tape or perforated pipe,

	farming in Nigeria and the seasons when it is required 1.2 Describe irrigation methods used in organic farming: drip irrigation, sprinkler irrigation, basin irrigation, furrow irrigation, watering can irrigation etc. 1.3 Explain the advantages and disadvantages of each irrigation method for organic crops 1.4 Describe how to calculate the amount of water needed to irrigate a crop plot 1.5 Explain water-use efficiency in organic farming: reducing losses from evaporation and runoff	seasonal rainfall gap data for Nigeria - Describe each irrigation method with diagrams and photographs - Discuss advantages and disadvantages of each method for organic crop production - Walk through crop water requirement calculation using a simple formula - Explain water-use efficiency practices: mulching, irrigation timing and drip system	diagrams, crop water requirement calculation guide, drip irrigation system photographs, projector, marker board, etc.	crop row on the college farm using locally available materials: drip tape or perforated pipe, water source and control valve - Record setup and water flow rate - Irrigate a 4m x 4m plot using furrow irrigation - Record the time taken, estimated water used and evenness of distribution across the plot - Irrigate a second 4m x 4m plot using watering cans - Compare the time, water volume and distribution with furrow irrigation - Record findings in a comparison table - Calculate the irrigation water requirement for a 20m x 20m tomato plot for one week using crop water requirement data - Record the calculation steps and result	irrigation line on a 5m crop row on the college farm using locally available materials: drip tape or perforated pipe, water source and control valve - Record setup and water flow rate - Irrigate a 4m x 4m plot using furrow irrigation - Record the time taken, estimated water used and evenness of distribution across the plot - Irrigate a second 4m x 4m plot using watering cans - Compare the time, water volume and distribution with furrow irrigation - Record findings in a comparison table - Calculate the	water source and control valve, watering cans, measuring containers, crop water requirement table, comparison table template, PPE, smartphones, etc.
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					irrigation water requirement for a 20m x 20m tomato plot for one week using crop water requirement data Record the calculation steps and result	
General Objective 4.0: Understand water conservation practices in organic crop production						
9-10	4.1 Explain the importance of water conservation in organic crop production 4.2 Describe water conservation practices: mulching, minimum tillage, cover cropping, contour planting, use of windbreaks, etc. 4.3 Explain how its increasing soil organic matter and improves water conservation on organic farms 4.4 Describe how to reduce water loss from farm ponds and storage tanks 4.5 Explain the link between water conservation and	- Explain water conservation importance in the context of Nigerian rainfall variability - Describe each conservation practice with farm diagrams and examples - Explain the SOM and water conservation relationship with soil moisture data - Describe pond and tank water loss reduction methods - Describe the Link of	Water conservation practice diagrams, SOM and soil moisture comparison data, pond management guide, projector, marker board, etc.	- Apply mulch to a 2m x 4m plot at 10cm depth - Leave an adjacent plot bare - Irrigate both equally - Measure soil moisture in both plots at 24 and 48 hours after irrigation and compare them - Establish a cover crop on a 2m x 4m plot - Compare soil moisture under the cover crop with an adjacent bare plot after one week - Carry out minimum tillage on a plot and conventional tillage on an adjacent plot - Irrigate both and compare water infiltration and soil	- Apply mulch to a 2m x 4m plot at 10cm depth - Leave an adjacent plot bare - Irrigate both equally - Measure soil moisture in both plots at 24 and 48 hours after irrigation and compare them - Establish a cover crop on a 2m x 4m plot - Compare soil moisture under the cover crop with an adjacent bare plot after one week	Mulch materials, cover crop seeds, soil moisture meter, action plan template, measuring containers, PPE, smartphones, etc.

	climate-smart organic farming	water conservation to climate-smart organic farming using practical examples		surface crust formation after drying • Prepare a water conservation action plan for the college farm • Identify three conservation practices, their location on the farm, expected benefit and implementation date	• Carry out minimum tillage on a plot and conventional tillage on an adjacent plot • Irrigate both and compare water infiltration and soil surface crust formation after drying • Prepare a water conservation action plan for the college farm • Identify three conservation practices, their location on the farm, expected benefit and implementation date	
General Objective 5.0: Know how to assess and maintain water quality for organic farm use						
11-12	5.1 Explain the importance of water quality in organic farming: crop production, livestock drinking and irrigation 5.2 Describe the physical, chemical and biological parameters of water	• Explain water quality importance in organic farming with examples of quality-related to crop and animal health problems • Describe water	Water quality parameter table, water quality test kit, contamination source photographs, water quality standards	• Collect water samples from three farm water sources: rain fall, farm pond or borehole, nearby stream, etc; test colour, pH, turbidity, dissolved oxygen, faecal coliform, etc.for each sample	Guide students to: • Collect water samples from three farm water sources: rain fall, farm pond or borehole, nearby stream, etc; test colour, pH, turbidity, dissolved oxygen,	Water quality test kit, sample collection containers, sand, gravel, filter container, turbidity

	quality: colour, pH, turbidity, dissolved oxygen, faecal coliform, etc. 5.3 Explain common sources of water contamination on organic farms: animal waste runoff, chemical spillage, sedimentation, algae growth, etc. 5.4 Describe simple methods for improving water quality on organic farms: sedimentation, filtration, covering storage tanks, buffer strips near water sources, etc. 5.5 Explain water quality standards for irrigation and livestock drinking in organic systems	quality parameters using a simple water quality parameter table • Describe common contamination sources with farm examples • Explain simple water quality improvement methods • Explain water quality standards for irrigation and livestock drinking	guide, projector, video. marker board, etc.	• Record results and compare with acceptable standards • Set up a simple sand-and-gravel filter to clean turbid water; pass a measured volume through the filter • Compare turbidity before and after filtration; record results • Observe sources of water contamination risk on the college farm: proximity of animal pens to water sources, uncovered tanks and bare soil near the pond • Record observation • Recommend one corrective action for each risk identified • Prepare a water quality monitoring schedule for the college farm: specify what to test, how often, who is responsible and what to do if a sample fails the standard	faecal coliform, etc.for each sample • Record results and compare with acceptable standards • Set up a simple sand-and-gravel filter to clean turbid water • Pass a measured volume through the filter; compare turbidity before and after filtration; record results • Observe sources of water contamination risk on the college farm: proximity of animal pens to water sources, uncovered tanks and bare soil near the pond • Record observation • Recommend one corrective action for each risk identified • Prepare a water quality monitoring schedule for the college farm:	comparison chart, monitoring schedule template, field notebooks, PPE, smartphones, etc.
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					specify what to test, how often, who is responsible and what to do if a sample fails the standard	
General Objective 6.0: Understand digital tools for water management on organic farms						
13-15	6.1 Explain how digital tools help organic farmers manage water more efficiently 6.2 Describe simple digital tools for water management: rain gauge apps, weather forecast apps 6.3 for water monitoring records and Google Maps for farm water source mapping 6.4 Explain how drone technology can be used to identify water flow patterns, waterlogged areas and irrigation coverage on organic farms 6.5 Describe how to keep digital water management records	• Explain digital water management tools with demonstrations on a smartphone • Profile each recommended tool and show one practical use for organic farm water management • Explain how drone imagery can support water management decisions on the farm • Describe how to set up a simple digital water record in Google Sheets or a farm app	Smartphones with internet, weather forecast app, Google Maps, Google Sheets, drone or drone footage, projector, video, marker board, etc.	• Use a weather forecast app or NIMET website to obtain a 7-day forecast; prepare a one-week irrigation schedule for a crop plot on the college farm based on the forecast rainfall and crop water requirement • Design a simple KoBoToolbox form for recording daily irrigation activities: include date, plot irrigated, irrigation method, water source and volume used • Test the form in the field • Use a drone or drone video footage to observe the distribution of water across a crop field after irrigation; identify any dry patches or waterlogged areas on the	Guide students to: • Use a weather forecast app or NIMET website to obtain a 7-day forecast; prepare a one-week irrigation schedule for a crop plot on the college farm based on the forecast rainfall and crop water requirement • Design a simple KoBoToolbox form for recording daily irrigation activities: include date, plot irrigated, irrigation method, water source and volume used • Test the form in the field	Smartphones with internet, weather forecast app, KoBoToolbox account, Google Sheets, drone or drone footage, farm sketch map template, irrigation schedule template, smartphones, PPE, etc.

	using a smartphone or computer			farm sketch map; recommend corrective action for each • Set up a Google Sheets water management logbook for the college farm: record all irrigation, rainfall and water quality events for one week; present the completed logbook to the class	• Use a drone or drone video footage to observe the distribution of water across a crop field after irrigation; identify any dry patches or waterlogged areas on the farm sketch map; recommend corrective action for each • Set up a Google Sheets water management logbook for the college farm: record all irrigation, rainfall and water quality events for one week; present the completed logbook to the class	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

PRACTICAL ORGANIC FARM OPERATIONS I**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: PRACTICAL ORGANIC FARM OPERATIONS I	COURSE CODE: OAT 126	CONTACT HOURS: 4 Hours/Week
	CREDIT UNIT: 4	THEORETICAL: 0 Hours/Week
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 4 Hours/Week

GOAL: This course is designed to equip learners with all practical organic farm skills acquired in Year I Semester I through supervised hands-on operations on the college organic farm.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Apply safe working practices and correct use of PPE on an organic farm;
- 2.0 Carry out land preparation and seedbed preparation on the college organic farm;
- 3.0 Know the establishment and management organic crop plots on the college farm;
- 4.0 Apply soil fertility management practices on the college farm;
- 5.0 Apply organic pest, disease and weed management on the college farm;
- 6.0 Carry out harvesting, handling and storage of organic produce from the college farm;
- 7.0 Maintain farm records and use digital tools for farm operations documentation.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: PRACTICAL ORGANIC FARM OPERATIONS I	COURSE CODE: OAT 126	CONTACT HOURS: 4 Hours/Week
	CREDIT UNIT: 4	THEORETICAL: 0 Hours/Week
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 4 Hours/Week

COURSE SPECIFICATION: THEORETICAL AND PRACTICAL

GOAL: This course is designed to equip learners with all practical organic farm skills acquired in Year I Semester I through supervised hands-on operations on the college organic farm.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Apply safe working practices and correct use of PPE on an organic farm						
1				- Identify all PPE available on the college farm - Demonstrate correct donning and doffing of each item: gloves, boots, overalls, face mask and eye protection - Identify all hand tools available on the college farm - Demonstrate the correct use of all hand tools available on the college farm: hoe, cutlass, fork, rake, spade and trowel; state the safety rule for each tool - Inspect the college farm	Guide students to: - Identify all PPE available on the college farm - Demonstrate correct donning and doffing of each item: gloves, boots, overalls, face mask and eye protection - Identify all hand tools available on the college farm - Demonstrate the correct use of all hand tools available on the college farm: hoe, cutlass, fork, rake,	Full PPE set, All available hand tools, Safety hazard inspection form, Field notebooks, College farm, etc.

				for safety hazards - Record at least five hazards observed including broken tools, exposed nails, uncovered pits and chemical containers - Recommend corrective action for each - Demonstrate correct manual lifting technique for heavy loads on the farm; list three common lifting injuries and how they are prevented	spade and trowel; state the safety rule for each tool - Inspect the college farm for safety hazards - Record at least five hazards observed including broken tools, exposed nails, uncovered pits and chemical containers - Recommend corrective action for each Demonstrate correct manual lifting technique for heavy loads on the farm; list three common lifting injuries and how they are prevented	
General Objective 2.0: Carry out land preparation and seedbed preparation on the college organic farm						
2 – 3				- Prepare a 10m x 20m plot on the college farm using minimum tillage - Record time taken, tools used and soil condition before and after preparation - Prepare three different seedbed types on the	Guide students to: - Prepare a 10m x 20m plot on the college farm using minimum tillage - Record time taken, tools used and soil condition before and after preparation	Hand tools, Compost, Weighing scale, Measuring tape, GPS smartphone app, Field notebooks, College farm plots, PPE, etc.

				college farm: flat bed, raised bed and ridge - Record dimensions, time taken and crop intended for each - Incorporate compost into the prepared plot at the recommended rate - Record quantity applied, application method and date - Use a GPS smartphone app to measure and record the area of the prepared plot; - Compare with the tape measure calculation and record both results	- Prepare three different seedbed types on the college farm: flat bed, raised bed and ridge - Record dimensions, time taken and crop intended for each - Incorporate compost into the prepared plot at the recommended rate - Record quantity applied, application method and date - Use a GPS smartphone app to measure and record the area of the prepared plot - Compare with the tape measure calculation and record both results	
General Objective 3.0: Know the establishment and management organic crop plots on the college farm						
4 – 7				Establish at least three different organic crop plots on the college farm: one cereal (maize or sorghum), one legume (cowpea or groundnut) and one vegetable (tomato, pepper or okra);	Guide students to: Establish at least three different organic crop plots on the college farm: one cereal (maize or sorghum), one legume (cowpea or groundnut) and one	Cereal, Legume and vegetable seeds, Nursery trays, Organic growing media, Watering cans, Measuring tape,

				record planting date, spacing and seedbed type for each • Establish a mixed intercrop plot of maize and cowpea on the college farm at recommended spacing • Record plant population and germination rate after 7 days • Set up and manage an organic nursery of at least 30 transplants: prepare growing media, sow seeds, water daily, apply shade and record germination and seedling growth weekly for four weeks • Carry out crop monitoring on all established plots weekly: record plant height, leaf colour, pest presence, weed pressure and any nutrient deficiency symptoms • Present monitoring data in a table at the end of the session	vegetable (tomato, pepper or okra); record planting date, spacing and seedbed type for each • Establish a mixed intercrop plot of maize and cowpea on the college farm at recommended spacing • Record plant population and germination rate after 7 days • Set up and manage an organic nursery of at least 30 transplants: prepare growing media, sow seeds, water daily, apply shade and record germination and seedling growth weekly for four weeks • Carry out crop monitoring on all established plots weekly • Record plant height, leaf colour, pest presence, weed pressure and any nutrient deficiency	Crop monitoring table template, College farm plots, PPE, etc.
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					symptoms • Present monitoring data in a table at the end of the session	
General Objective 4.0: Apply soil fertility management practices on the college farm						
8 – 9				• Apply compost as basal dressing to two crop plots before planting • Record the quantity applied, area covered and application method • Apply farmyard manure as a top dressing to one established crop plot • Record the rate, method and date of application • Monitor crop response after 7 days • Prepare compost tea as a foliar feed • Record the preparation process • Apply the prepared compost tea to one crop plot as a foliar feed • Record dilution rate, application date and any visible crop response after 7 days • Collect soil samples from three college farm plots;	Guide students to: • Apply compost as basal dressing to two crop plots before planting • Record the quantity applied, area covered and application method • Apply farmyard manure as a top dressing to one established crop plot • Record the rate, method and date of application • Monitor crop response after 7 days • Prepare compost tea as a foliar feed • Record the preparation process • Apply the prepared compost tea to one crop plot as a foliar feed	Compost, Farmyard manure, Compost tea brewing equipment, Soil pH test kit, Sampling bags, Weighing scale, Field notebooks, College farm plots, PPE, etc.

				test pH using a field test kit Record results and recommend an organic amendment for any plot showing pH outside the acceptable range for the crop grown	- Record dilution rate, application date and any visible crop response after 7 days - Collect soil samples from three college farm plots; test pH using a field test kit - Record results and recommend an organic amendment for any plot showing pH outside the acceptable range for the crop grown	
General Objective 5.0: Apply organic pest, disease and weed management on the college farm						
10 – 12				- Carry out a pest and disease scouting exercise on all established crop plots - Record pest species, crop affected, damage level and recommended organic control action for each finding - Prepare and apply neem leaf extract to one infested crop plot - Calibrate the knapsack sprayer before application - Record application	Guide students to: - Carry out a pest and disease scouting exercise on all established crop plots - Record pest species, crop affected, damage level and recommended organic control action for each finding - Prepare and apply neem leaf extract to one infested crop plot - Calibrate the knapsack sprayer before	Scouting recording form, neem leaves, extraction equipment, calibrated knapsack sprayer, PPE, weighing scale, mulch materials, drone or drone footage, farm sketch map, etc.

				details and count pest numbers before and 7 days after application • Carry out manual weeding on all crop plots • Record weed species, weed density per square metre and time taken for each plot • Apply mulch to one weeded plot and leave one without mulch • Use a drone or drone video footage to assess pest damage and weed pressure across the college farm plots from above • Annotate the farm sketch map with hotspots and recommend targeted organic management for each	application • Record application details and count pest numbers before and 7 days after application • Carry out manual weeding on all crop plots • Record weed species, weed density per square metre and time taken for each plot • Apply mulch to one weeded plot and leave one without mulch • Use a drone or drone video footage to assess pest damage and weed pressure across the college farm plots from above • Annotate the farm sketch map with hotspots and recommend targeted organic management for each	
General Objective 6.0: Carry out harvesting, handling and storage of organic produce from the college farm						
13 – 14				• Harvest all mature crops from the college farm plots at the correct maturity stage using	Guide students to: • Harvest all mature crops from the college farm plots at the	Harvesting tools, grading bins, packaging materials, label templates,

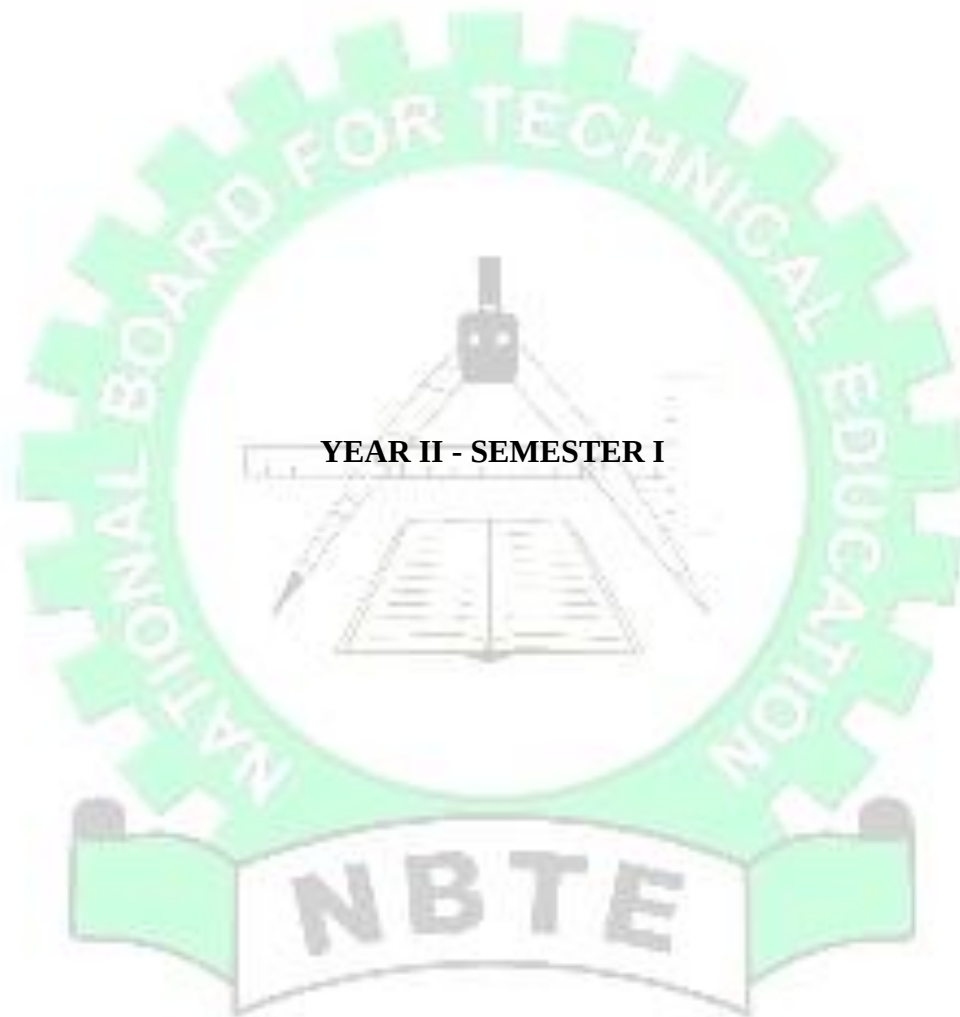
				appropriate tools • Record crop name, maturity indicator, date and quantity harvested for each crop • Carry out and grading all of harvested produce into quality grades • Record grading criteria used and percentage in each grade • Perform and labelling of graded produce using appropriate materials • Label with crop name, harvest date, farm name and organic claim • Store grain crops in three storage types: open sack, hermetic bag and metal bin • Record storage method, initial moisture content and inspect for pest and quality changes after 2 weeks	correct maturity stage using appropriate tools • Record crop name, maturity indicator, date and quantity harvested for each crop • Carry out and grading all of harvested produce into quality grades • Record grading criteria used and percentage in each grade • Perform and labelling graded produce using appropriate materials • Label with crop name, harvest date, farm name and organic claim • Store grain crops in three storage types: open sack, hermetic bag and metal bin • Record storage method, initial moisture content and inspect for pest and quality changes after 2 weeks	open sacks, hermetic bags, metal bins, moisture meter, field notebooks, etc.
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General Objective 7.0: Maintain farm records and use digital tools for farm operations documentation

15				• Complete a practical logbook covering all farm operations carried out during this course: include date, activity, area, materials used, quantity and observation for every session; submit logbook for end-of-semester assessment • Enter all farm activities from the semester into a Google Sheets digital farm record organised by date and activity type; export as PDF and submit • Use a drone or drone video footage to carry out a final aerial assessment of the college farm: compare current farm condition with the sketch map made at the start of the semester • Document all changes in a one-page progress report • Present a summary of farm operations carried out during the semester: highlight three	Guide students to: • Complete a practical logbook covering all farm operations carried out during this course: include date, activity, area, materials used, quantity and observation for every session; submit logbook for end-of-semester assessment • Enter all farm activities from the semester into a Google Sheets digital farm record organised by date and activity type; export as PDF and submit • Use a drone or drone video footage to carry out a final aerial assessment of the college farm • Compare current farm condition with the sketch map made at the start of the semester • Document all changes	Practical logbook template, Google Sheets on smartphones or computers, drone or drone footage, earlier farm sketch map for comparison, field notebooks, projector for presentations, etc.
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				achievements and one area for improvement	in a one-page progress report • Present a summary of farm operations carried out during the semester: highlight three achievements and one area for improvement	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						





ORGANIC POST-HARVEST HANDLING AND VALUE ADDITION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC POST-HARVEST HANDLING AND VALUE ADDITION	COURSE CODE: OAT 211	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 the knowledge and practical skills to manage post-harvest, and add value to organic agricultural produce in ways that maintain quality and meet market requirements.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the importance of post-harvest management in organic agriculture;
- 2.0 Know harvesting and primary handling of organic produce;
- 3.0 Know grading, sorting and packaging of organic produce;
- 4.0 Understand storage methods for organic crops;
- 5.0 Understand primary processing and value addition to organic produce;
- 6.0 Understand food safety and hygiene in organic post-harvest operations;
- 7.0 Know record keeping and marketing for organic post-harvest products.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**COURSE TITLE:** ORGANIC POST-HARVEST HANDLING & VALUE ADDITION**COURSE CODE:** OAT 211**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**

This course is designed to equip students with the knowledge and practical skills to manage post-harvest, and add value to organic agricultural produce in ways that maintain quality and meet market requirements.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand the importance of post-harvest management in organic agriculture						
1	1.1 Define post-harvest management. 1.2 Explain the importance of organic agriculture 1.3 Explain the causes of post-harvest losses in Nigeria: physical damage, pests, diseases, moisture, temperature. etc. 1.4 Explain the effects of post-harvest losses in Nigeria: quality loss, low market price, loss in quantity, etc. 1.5 Describe the scale of post-harvest losses for major organic crops in	• Explain post-harvest management. • Explain the importance of Organic agriculture • Describe causes of post-harvest losses using photographs of damaged produce • Explain the scale of post-harvest losses for major organic crops in Nigeria • Describe how good post-harvest practices protect	Post-harvest loss statistics for Nigeria, photographs of post-harvest damage, certified organic post-harvest requirements guide, projector, marker board, etc.	• Visit a local market or storage facility • Observe and record at least five types of post-harvest damage on produce • Photograph each and identify the likely cause • Interview three traders or farmers on their post-harvest challenges • Record the crop, the problem and what they currently do to manage it • Present findings to the class • Prepare a summary of the post-harvest loss situation	Guide students to: • Visit a local market or storage facility • Observe and record at least five types of post-harvest damage on produce • Photograph each and identify the likely cause • Interview three traders or farmers on their post-harvest challenges • Record the crop, the problem and what they currently do to manage it; present	Local market or storage facility, observation checklist, survey guide, post-harvest loss data, transport, etc.

	Nigeria 1.6 Explain how good post-harvest practices protect organic produce quality and market value 1.7 Describe the special post-harvest requirements of certified organic produce: no synthetic preservatives, no irradiation and separation from conventional produce	organic produce quality and market value • Explain the special post-harvest requirements of certified organic produce: no synthetic preservatives, no irradiation and separation from conventional produce		for one major organic crop in Nigeria using available data	findings to the class • Prepare a summary of the post-harvest loss situation for one major organic crop in Nigeria using available data	
General Objective 2.0: Know harvesting and primary handling of organic produce						
2 – 3	2.1 Describe the concept of maturity indices and how they guide harvest timing for different organic crops 2.2 Describe harvesting tools and equipment for major organic crops in Nigeria 2.3 Explain the principles of careful harvesting to minimise physical damage to organic produce 2.4 Describe primary	• Explain the concept of maturity indices and how they guide harvest timing for different organic crops in Nigeria • Describe harvesting tools and equipment for major organic crops in Nigeria • Explain careful harvesting techniques with farm examples	Maturity index chart for major crops, harvesting tools display, primary handling photographs, contamination prevention guide, projector, videos, marker board, etc.	• Harvest a crop from the college farm at the correct maturity stage using appropriate tools • Record crop name, maturity indicator observed, date and quantity harvested • Demonstrate careful harvesting technique on three different crops • Record the tool used, method and any damage caused during harvest • Carry out trimming and	Guide students to: • Harvest a crop from the college farm at the correct maturity stage using appropriate tools • Record crop name, maturity indicator observed, date and quantity harvested • Demonstrate careful harvesting technique on three different crops • Record the tool used,	College farm crops ready for harvest, harvesting tools, trimming knives, washing basins, clean water, maturity index chart, recording forms, smartphones, PPE, etc.

	handling operations after harvest: field packing, field cooling, trimming, washing, etc. 2.5 Describe how to prevent contamination of organic produce during harvesting and primary handling	• Explain primary handling operations after harvest: field packing, field cooling, trimming and washing • Explain how to prevent contamination of organic produce during harvesting and primary handling		washing of freshly harvested vegetables • Record the procedure, water used and any cleaning agent applied • Check against organic certification requirements • Inspect harvested produce for any chemical or physical contamination risk; record findings and corrective actions taken	method and any damage caused during harvest • Carry out trimming and washing of freshly harvested vegetables • Record the procedure, water used and any cleaning agent applied • Check against organic certification requirements • Inspect harvested produce for any chemical or physical contamination risk; record findings and corrective actions taken	
General Objective 3.0: Know grading, sorting and packaging of organic produce						
4 – 5	3.1 Define grading and sorting 3.2 Explain the importance of grading and sorting in organic marketing 3.3 Describe grading standards for major Nigerian organic crops: size, colour, shape,	• Discuss grading and sorting with examples of grade standards for Nigerian markets. • Explain the importance of grading and sorting and in organic	Grade standard photographs, packaging material samples, organic label samples, labelling requirement guide, projector,	• Sort batch of harvested produce • Grade a batch of harvested produce into at least three quality grades • Record the grading criteria used and the percentage of produce in each grade	Guide students to: • Sort batch of harvested produce • Grade a batch of harvested produce into at least three quality grades • Record the grading criteria used and the	Harvested produce for grading, packaging materials, weighing scale, label template, market access, field notebooks, transport, smartphones, PPE, etc.

	freedom from damage and moisture content 3.4 Describe packaging materials suitable for organic produce: paper bags, natural fibre sacks, wooden crates, woven baskets, approved plastic containers, etc. 3.5 Describe the organic labelling requirements for packaged produce: product name, farm name, certifying body, net weight and harvest date 3.6 Describe how proper packaging protects organic produce quality during transport and storage	marketing • Explain the grading criteria using standard for major crops using photographs of different quality grades for major Nigerian organic crops: size, colour, shape, freedom from damage and moisture content • Explain packaging materials suitable for organic produce: paper bags, natural fibre sacks, wooden crates, woven baskets, approved plastic containers, etc. • Explain the organic labelling requirements for packaged produce: product name, farm name, certifying body, net weight and harvest date • Explain how	marker board, etc.	• Package 2kg of graded organic produce using two different packaging materials • Compare the ease of use, cost and suitability of each for the market • Label a packaged organic product with all required information: product name, farm name, certifying body, net weight and harvest date • Assess the packaging used by five traders in a local market for organic produce • Record packaging type, labelling completeness and any quality concerns observed	percentage of produce in each grade • Package 2kg of graded organic produce using two different packaging materials • Compare the ease of use, cost and suitability of each for the market • Label a packaged organic product with all required information: product name, farm name, certifying body, net weight and harvest date • Assess the packaging used by five traders in a local market for organic produce • Record packaging type, labelling completeness and any quality concerns observed	
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		packaging protects produce quality during transport and storage				
General Objective 4.0: Understand storage methods for organic crops						
6 – 8	4.1 Explain the factors that affect Shelf life of organic produce: temperature, humidity, ventilation, pest presence and maturity at harvest 4.2 Describe storage structures used for organic crops in Nigeria: cribs, barns, silos, hermetic bags, cold rooms, traditional storage pits, etc. 4.3 Explain the principles of hermetic storage and its benefits for organic grain and legume storage 4.4 Describe pest management in organic storage: clean storage, diatomaceous earth, neem leaf, dried chilli, physical exclusion, etc. 4.5 Describe the storage	• Discuss the factors that affect Shelf life of organic produce: temperature, humidity, ventilation, pest presence and maturity at harvest • Describe storage structures used for organic crops in Nigeria: cribs, barns, silos, hermetic bags, cold rooms and traditional storage pits • Explain hermetic storage principles and demonstrate hermetic bag sealing • Explain pest management in organic storage: clean storage,	Storage structure photographs, hermetic bag samples, organic storage pest management guide, diatomaceous earth sample, projector, videos, marker board, etc.	• Store the same grain in three containers: an open sack, a hermetic bag and a metal bin • Record grain condition, moisture and insect presence in each after 2 weeks • Compare results • Apply diatomaceous earth to a grain sample at the recommended rate; mix thoroughly; store in a clean container • Check for insect activity after 1 week and record findings • Inspect a storage structure on the college or nearby farm • Record cleanliness, pest signs, ventilation, moisture and structural condition • Recommend three improvements	Guide students to: • Store the same grain in three containers: an open sack, a hermetic bag and a metal bin • Record grain condition, moisture and insect presence in each after 2 weeks • Compare results • Apply diatomaceous earth to a grain sample at the recommended rate; mix thoroughly; store in a clean container • Check for insect activity after 1 week and record findings • Inspect a storage structure on the college or nearby farm • Record cleanliness, pest signs, ventilation, moisture and	Open sacks, hermetic bags, metal bins, grain samples, diatomaceous earth, moisture meter, thermometer, nearby storage structure, smartphones, field notebooks, PPE, etc.

	requirements of perishable organic produce: vegetables, fruits and fresh herbs	diatomaceous earth, neem leaf, dried chilli and physical exclusion • Explain the storage requirements of perishable organic produce like vegetables, fruits and fresh herbs		• Set up a simple cool storage for fresh organic vegetables: shade, wet sacking and good ventilation • Record temperature inside and outside the cool store • Compare produce condition after 3 days	structural condition • Recommend three improvements • Set up a simple cool storage for fresh organic vegetables: shade, wet sacking and good ventilation • Record temperature inside and outside the cool store • Compare produce condition after 3 days	
General Objective 5.0: Understand primary processing and value addition to organic produce						
9 – 11	5.1 Define value addition. 5.2 Explain value addition importance for organic farmers in Nigeria: increased income, reduced post-harvest losses, market differentiation, etc. 5.3 Describe primary processing operations for major organic crops: drying, milling, oil extraction, juice making, fermentation, etc. 5.4 Describe the equipment	• Define value addition and explain its importance in respect to income, reduced post-harvest losses, market differentiation, etc. with Nigerian examples • Explain the primary processing operations of drying, milling, oil extraction, juice	Processing operation flow diagrams, value-added product photographs, market price data for organic value-added products, processing equipment display, projector, marker board, etc.	• Dry a sample of one organic crop (moringa, pepper or ginger, etc.) using shade/solar drying • Record initial fresh weight, drying time, final dry weight and percentage moisture loss • Mill or grind a dried organic product (ginger or moringa) using a manual grinder • Record quantity processed, processing time and quality of the final product	Guide students to: • Dry a sample of one organic crop (moringa, pepper or ginger, etc.) using shade/solar drying • Record initial fresh weight, drying time, final dry weight and percentage moisture loss • Mill or grind a dried organic product (ginger or moringa) using a manual	Moringa leaves, ginger or pepper for drying, groundnuts, manual grinder, manual oil press, weighing scale, drying trays, packaging materials, label template, notebooks, smartphone, PPE, etc.

	and facilities required for simple organic produce processing 5.5 Explain how to maintain organic integrity during processing: no synthetic additives, proper cleaning of equipment and separation from conventional produce 5.6 Describe value-added organic products with market potential in Nigeria: dried moringa, groundnut oil, ginger powder, zobo drink, pineapple, pawpaw, coconut, palm oil, etc.	making and fermentation with photographs and simple flow diagrams • Explain equipment and facility requirements for small-scale organic processing • Discuss how to maintain organic integrity during processing no synthetic additives, proper cleaning of equipment and separation from conventional produce • Explain value-added organic products with market potential in Nigeria like dried moringa, groundnut oil, ginger powder, zobo drink and palm oil		• Extract groundnut oil from a small quantity of organically grown groundnuts using a manual press • Record quantity of groundnuts used, oil volume extracted and residual cake weight • Package and label a value-added organic product produced during this course: include product name, ingredients, farm name, processing date and organic claim on the label • Determine the profit from value addition • Compare the selling price of the raw product with the selling price of the processed product for the same quantity • Record the value added per kilogram	grinder • Record quantity processed, processing time and quality of the final product • Extract groundnut oil from a small quantity of organically grown groundnuts using a manual press • Record quantity of groundnuts used, oil volume extracted and residual cake weight • Package and label a value-added organic product produced during this course: include product name, ingredients, farm name, processing date and organic claim on the label • Determine the profit from value addition • Compare the selling price of the raw product with the selling price of the processed product for the same quantity • Record the value	
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					added per kilogram	
General Objective 6.0: Understand food safety and hygiene in organic post-harvest operations						
12-13	6.1 Explain the importance of food safety and hygiene in organic post-harvest operations 6.2 Describe personal hygiene requirements for workers handling organic produce: handwashing, clean clothing, no smoking and no eating in processing areas 6.3 Describe facility hygiene requirements: clean surfaces, pest exclusion, clean water supply and waste management 6.4 Explain common food safety hazards in organic post-harvest operations: physical contamination, microbial contamination and cross-contamination with conventional produce 6.5 Describe the use of PPE in organic post-harvest operations: gloves, aprons, hair nets, clean	• Explain food safety importance with examples of food safety failures in Nigerian markets • Explain personal hygiene requirements using a food handler hygiene checklist • Explain the requirements for facility hygiene with examples of compliant and non-compliant facilities • Explain food safety hazards and their prevention in organic post-harvest operations • Explain the use of PPE in organic post-harvest operations: gloves, aprons, hair nets and clean footwear	Food handler hygiene checklist, food safety hazard guide, PPE display, facility hygiene photographs, projector, marker board, etc.	• Carry out a hygiene audit of the college farm post-harvest handling area • Score each item on a 10-item hygiene checklist • Record findings • Recommend three specific improvements • Demonstrate correct handwashing procedure using soap and clean water • Record the steps followed and time taken • Set up a simple clean processing area for organic produce: lay clean surface cover, prepare clean water, put on PPE and inspect for any pest signs before starting work • Record each step • Identify three food safety hazards in a post-harvest handling scenario presented by the lecturer • Record identified hazards • Recommend one	Guide students to: • Carry out a hygiene audit of the college farm post-harvest handling area • Score each item on a 10-item hygiene checklist • Record findings • Recommend three specific improvements • Demonstrate correct handwashing procedure using soap and clean water • Record the steps followed and time taken • Set up a simple clean processing area for organic produce: lay clean surface cover, prepare clean water, put on PPE and inspect for any pest signs before starting work	Hygiene audit checklist, soap, clean water, PPE, processing area, field notebooks, smartphones, etc.

	footwear, etc.			corrective action for each hazard	- Record each step - Identify three food safety hazards in a post-harvest handling scenario presented by the lecturer - Record identified hazards - Recommend one corrective action for each hazard	
General Objective 7.0: Know record keeping and marketing for organic post-harvest products						
14-15	7.1 Describe the record keeping requirements for organic post-harvest operations: harvest records, storage records, processing records and sales records 7.2 Describe how to use a smartphone or simple app to keep digital post-harvest records 7.3 Explain basic marketing for organic post-harvest products: identifying buyers, setting prices, using social media, WhatsApp Business,	- Explain the record keeping requirements for organic post-harvest operations: harvest records, storage records, processing records and sales records - Describe how to use a smartphone or simple app or farm app to keep digital post-harvest records - Explain basic marketing for organic post-harvest products: identifying buyers,	Post-harvest record templates, smartphones with Google Sheets or farm app, WhatsApp Business guide, marketing guide, projector, marker board, etc.	- Complete post-harvest records for produce handled during this course: fill harvest record, storage record and processing record templates with accurate data - Create a digital record of one week of post-harvest activities using Google Sheets on a smartphone - Record crop, quantity, storage method, processing done and sale destination - Create a WhatsApp Business catalogue for two organic value-added products produced during	Guide students to: - Complete post-harvest records for produce handled during this course: fill harvest record, storage record and processing record templates with accurate data - Create a digital record of one week of post-harvest activities using Google Sheets on a smartphone - Record crop, quantity, storage method, processing done and sale	Post-harvest record templates, smartphones with Google Sheets and WhatsApp Business, product samples for display, label templates, price list template, field notebooks, etc.

	etc. 7.4 Describe how to present organic products attractively to buyers at local markets, agri-fairs and online platforms	setting prices, using social media and WhatsApp Business using Nigerian examples • Discuss how to present and display products in local markets and online platforms.		this course: include product name, price, quantity, photograph and farm contact • Prepare a simple display table for three organic products: arrange products attractively, place labels clearly and prepare a price list • Present the display to the class for feedback	destination • Create a WhatsApp Business catalogue for two organic value-added products produced during this course: include product name, price, quantity, photograph and farm contact • Prepare a simple display table for three organic products: arrange products attractively, place labels clearly and prepare a price list • Present the display to the class for feedback	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ORGANIC POULTRY PRODUCTION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC POULTRY PRODUCTION	COURSE CODE: OAT 212	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 the knowledge and practical skills to establish and manage organic poultry enterprises including layers, broilers and local breeds.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the principles and importance of organic poultry production;
- 2.0 Know housing and equipment management in organic poultry production;
- 3.0 Know organic nutrition and feeding management for poultry;
- 4.0 Understand organic health and biosecurity management in poultry production;
- 5.0 Know how to manage organic layer production;
- 6.0 Understand how to manage organic broiler and local chicken production;
- 7.0 Understand record keeping and marketing in organic poultry enterprises.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ORGANIC POULTRY PRODUCTION				COURSE CODE: OAT 212		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 the knowledge and practical skills to establish and manage organic poultry enterprises including layers, broilers and local breeds.						
	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand the principles and importance of organic poultry production						
1	1.1 Define organic poultry production 1.2 Explain organic poultry production importance in Nigeria 1.3 Describe the principles of organic poultry production: access to outdoor range, natural feed, prohibition of routine antibiotics and synthetic growth promoters 1.4 Explain the difference between organic, free-range and conventional poultry management 1.5 Describe poultry	- Define organic poultry production and explain importance with Nigerian market examples - Discuss principles using the Nigerian Organic Agriculture Standard - Explain organic, free-range and conventional management using a comparison table - Describe poultry	Nigerian Organic Agriculture Standard, organic vs conventional poultry comparison table, poultry species photographs, certification requirements guide, projector, videos, marker board, etc. 			

	species kept in organic systems in Nigeria: layers, broilers, local chickens, turkeys and guinea fowl 1.6 Explain the certification requirements for organic poultry production	species with photographs and production data • Explain certification requirements for organic poultry			free-range management • Document their responses and present to the class	
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General Objective 2.0: Know housing and equipment management in organic poultry production

2 – 3	2.1 Describe housing requirements for organic poultry: floor space per bird, ventilation, natural lighting, perches, nest boxes, outdoor run access, etc. 2.2 Explain the design of an organic layer house and an organic broiler house 2.3 Describe equipment used in organic poultry production: feeders, drinkers, perches, nest boxes, catching crates, etc. 2.4 Explain cleaning and disinfection procedures	- Describe housing requirements with floor space calculations and ventilation - Discuss organic layer and broiler house design with labelled diagrams - Describe poultry equipment and explain correct use - Explain cleaning and disinfection using allowed organic disinfectants - Describe biosecurity measures with photographs of	Organic layer and broiler house design diagrams, equipment display, floor space calculation guide, cleaning and disinfection guide, biosecurity checklist, projector, videos, marker board, etc.	- Assess the college farm poultry house or a nearby organic poultry house against organic housing requirements - Record floor space per bird, ventilation, perches, nest boxes and outdoor access - Recommend improvements - Clean a poultry pen - Disinfect a poultry pen using an allowed organic disinfectant - Record the cleaning procedure, materials used and time taken - Identify the function of all equipment in the	Guide students to: - Assess the college farm poultry house or a nearby organic poultry house against organic housing requirements - Record floor space per bird, ventilation, perches, nest boxes and outdoor access - Recommend improvements - Clean a poultry pen - Disinfect a poultry pen using an allowed organic disinfectant - Record the cleaning procedure, materials	College farm poultry house or nearby organic poultry farm, housing assessment checklist, organic disinfectant, cleaning equipment, equipment condition recording form, house design template, transport, etc.
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	for organic poultry houses using allowed disinfectants 2.5 Describe biosecurity measures for organic poultry farms	compliant organic farms		college farm poultry unit - Record equipment name, number available and condition - Design a simple organic layer house for 100 birds: specify floor space, ventilation, perches, nest boxes and outdoor run; present as a labelled sketch	used and time taken - Identify the function of all equipment in the college farm poultry unit - Record equipment name, number available and condition - Design a simple organic layer house for 100 birds: specify floor space, ventilation, perches, nest boxes and outdoor run; present as a labelled sketch	
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General Objective 3.0: Know organic nutrition and feeding management for poultry

4 – 5	3.1 Explain the nutritional requirements of organic poultry at different stages: chick, grower and layer or finisher 3.2 Describe allowed feed ingredients in certified organic poultry production 3.3 Describe prohibited feed ingredients: synthetic amino acids, GMO ingredients, animal by-products and synthetic growth	- Explain nutritional requirements using a poultry nutrient requirement table by stage - Describe allowed and prohibited feed ingredients using the Nigerian Organic Agriculture Standard - Discuss simple ration formulation	Poultry nutrient requirement table, Nigerian Organic Agriculture Standard, feed ingredient list, ration formulation guide, feed storage photographs, projector, video, marker board, etc.	- Identify feed ingredients available on or near the college farm - Classify each as allowed or prohibited in organic poultry production - Formulate a simple daily ration for 20 layers using locally available organic ingredients - Record ingredients, quantities and estimated protein and energy content	Guide students to: - Identify feed ingredients available on or near the college farm - Classify each as allowed or prohibited in organic poultry production - Formulate a simple daily ration for 20 layers using locally available organic ingredients	Available feed ingredients, ration formulation template, weighing scale, mixing containers, feed quality assessment checklist, Nigerian Organic Agriculture Standard, smartphones, PPE, etc.
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	promoters 3.4 Explain how to formulate a simple organic poultry ration using locally available ingredients 3.5 Describe feed storage and quality requirements for organic poultry production	using locally available organic ingredients Describe feed storage requirements and quality checks		- Mix a small batch of organic poultry feed - Record each ingredient, quantity and mixing method - Assess the quality of a feed sample - Check colour, smell, moisture and presence of mould or insects - Record findings and state whether the feed is acceptable for use	- Record ingredients, quantities and estimated protein and energy content - Mix a small batch of organic poultry feed - Record each ingredient, quantity and mixing method - Assess the quality of a feed sample - Check colour, smell, moisture and presence of mould or insects - Record findings and state whether the feed is acceptable for use	
General Objective 4.0: Understand organic health and biosecurity management in poultry production						
6 – 7	4.1 Explain the health management principles in organic poultry: prevention first, natural treatments preferred and conditional use of conventional medicine based on the organic standards 4.2 Describe preventive health practices: vaccination, good	- Explain organic health management principles using the Nigerian Organic Agriculture Standard - Discuss preventive practices with examples from Nigerian organic poultry farms - Describe common	Nigerian Organic Agriculture Standard, common poultry disease photographs, vaccination schedule guide, herbal remedy preparation guide, health record template, videos, projector, marker	- Carry out a health assessment of the college farm poultry flock: observe behaviour, plumage, eyes, droppings and mobility; record findings and identify any health concerns - Observe a vaccination exercise on the college farm or nearby farm - Record the vaccination	Guide students to: - Carry out a health assessment of the college farm poultry flock: observe behaviour, plumage, eyes, droppings and mobility; record findings and identify any health concerns - Observe a vaccination exercise	College farm poultry flock or nearby farm, health observation form, vaccination materials, garlic, turmeric, onion or ginger, for herbal remedy, health record template, field notebooks,

	nutrition, clean housing and rotational outdoor grazing 4.3 Explain common poultry diseases in Nigeria and their organic management: Newcastle disease, Gumboro, coccidiosis, fowl typhoid, etc. 4.4 Explain allowed treatments in certified organic poultry: herbal remedies and approved veterinary medicines with mandatory withdrawal periods based on the organic standards 4.5 Explain the record keeping requirements for organic poultry health management	diseases with photographs of clinical signs and organic management • Explain allowed treatments and withdrawal period requirements • Describe record keeping for organic poultry health certification	board, etc.	exercise on the college farm or nearby farm • Record vaccine name, route of administration, birds vaccinated and date • Prepare a herbal poultry health remedy (garlic or ginger extract) • Record materials, preparation and intended use • Complete a poultry health management record for one week of college farm flock observations	on the college farm or nearby farm • Record the vaccination exercise on the college farm or nearby farm • Record vaccine name, route of administration, birds vaccinated and date • Prepare a herbal poultry health remedy (garlic or ginger extract) • Record materials, preparation and intended use • Complete a poultry health management record for one week of college farm flock observations	transport, smartphones, PPE, etc.
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General Objective 5.0: Know how to manage organic layer production

8- 10	5.1 Describe the production stages of organic layers: brooding, growing, point of lay and laying 5.2 Explain lighting, feeding and housing management for organic layers at each	• Explain layer production stages with a layer management calendar • Discuss management requirements at each stage with	Layer management calendar, feed guide for layers by stage, egg grading chart, organic egg labelling guide, production schedule template, projector, video,	• Collect eggs from the college organic farm layer unit daily for one week • Record number collected, number cracked and average daily production per bird • Grade collected eggs by	Guide students to: • Collect eggs from the college organic farm layer unit daily for one week • Record number collected, number cracked and average daily production per	College farm organic layer unit, egg collection recording form, egg grading chart, egg packaging materials, label template, layer
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	stage 5.3 Describe egg collection, cleaning, grading and packaging procedures for organic eggs 5.4 Explain organic egg quality standards and labelling requirements 5.5 Describe a typical production schedule and expected performance for organic layers in Nigeria	feed and lighting guides • Describe egg collection, cleaning, grading and packaging with photographs • Explain organic egg quality and labelling requirements • Present a typical organic layer production schedule with performance benchmarks	marker board, etc.	size and shell quality • Record percentage in each grade • Clean, pack and label a tray of organic eggs • Record cleaning method, packing date, farm name and organic claim on the label • Prepare a one-week layer management schedule for 50 birds • Specify feed quantity, water, lighting hours and egg collection time for each day • Compute the feed conversion ratio for the college farm layer unit for one week • Record feed consumed and eggs produced • Calculate cost per dozen eggs	bird • Grade collected eggs by size and shell quality • Record percentage in each grade • Clean, pack and label a tray of organic eggs • Record cleaning method, packing date, farm name and organic claim on the label • Prepare a one-week layer management schedule for 50 birds • Specify feed quantity, water, lighting hours and egg collection time for each day • Compute the feed conversion ratio for the college farm layer unit for one week • Record feed consumed and eggs produced • Calculate cost per dozen eggs	management schedule template, weighing scale, smartphones, PPE, field notebooks, etc.
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General Objective 6.0: Understand how to manage organic broiler and local chicken production

11-13	6.1 Explain the production cycle of organic broilers: brooding, growing and finishing stages 6.2 Explain the management of organic local chicken breeds: housing, feeding, outdoor ranging and health 6.3 Describe feeding management for organic broilers and local chickens at each stage 6.4 Explain the slaughter and processing of organic poultry: humane slaughter, bleeding, scalding, defeathering, evisceration and chilling 6.5 Describe the marketing of organic broilers and local chickens: live bird sales, processed carcass and whole bird packaging	• Describe broiler production cycle with a broiler management calendar • Explain local chicken management with Nigerian village poultry examples • Discuss feeding management at each stage with feed quantity guides • Explain organic slaughter and processing with a step-by-step procedure • Describe marketing channels for organic broilers and local chickens	Broiler management calendar, local chicken management guide, feed quantity chart by stage, humane slaughter procedure guide, marketing channel diagram, projector, video, marker board, etc.	• Monitor the growth of broilers or local chickens on the college farm • Weigh five birds weekly for three weeks • Record individual weights and compute mean weekly weight gain • Observe and record the feeding behaviour and outdoor ranging activity of local chickens on the college farm for one hour • Record number ranging, feeding activity and any health observations • Calculate the feed conversion ratio for the college farm broiler unit for one week • Record feed consumed and weight gained • Compare with organic production benchmarks • Assist in the organic humane slaughter and processing of one or two poultry birds • Observe and record each step from restraint to	Guide students to: • Monitor the growth of broilers or local chickens on the college farm • Weigh five birds weekly for three weeks • Record individual weights and compute mean weekly weight gain • Observe and record the feeding behaviour and outdoor ranging activity of local chickens on the college farm for one hour • Record number ranging, feeding activity and any health observations • Calculate the feed conversion ratio for the college farm broiler unit for one week • Record feed consumed and	College farm broiler or local chicken unit, weighing scale, feed conversion recording form, slaughter and processing equipment, packaging materials, smartphones, label template, field notebooks, PPE, etc.
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				chilling/freezing • Package a processed organic chicken carcass • Record weight, wrap in approved material, label with bird type, weight, farm name and processing date	weight gained • Compare with organic production benchmarks • Assist in the organic humane slaughter and processing of one or two poultry birds • Observe and record each step from restraint to chilling/freezing • Package a processed organic chicken carcass • Record weight, wrap in approved material, label with bird type, weight, farm name and processing date	
General Objective 7.0: Understand record keeping and marketing in organic poultry enterprises						
14-15	7.1 Explain the records required in certified organic poultry production: feed records, health records, production records, sales records, etc. 7.2 Describe how to use a online tools e.g. Google	• Explain required records and walk through each record type using completed samples • Describe digital record keeping using Google Sheets on a	Sample organic poultry records, smartphones with Google Sheets, Nigerian poultry market price data, profitability calculation template,	• Complete a full set of organic poultry records for one week of college farm operations: fill feed, health, production and sales record templates accurately • Enter one week of poultry records into Google	Guide students to: • Complete a full set of organic poultry records for one week of college farm operations: fill feed, health, production and sales record templates accurately	Organic poultry record templates, smartphones with Google Sheets and WhatsApp Business, profitability calculation template,

	Sheets to keep digital poultry farm records 7.3 Explain basic marketing for organic poultry products: live birds, eggs, processed carcasses and organic poultry manure 7.4 Describe how to calculate the profitability of an organic poultry enterprise	smartphone • Explain marketing options for organic poultry products with Nigerian price data • Describe profitability calculation for a small organic layer or broiler unit	projector, marker board, etc.	Sheets; export as PDF and submit • Prepare profitability analysis for the college farm poultry unit • Record total feed cost, other costs, gross income and net profit for one month • Create a catalogue for college farm organic eggs or live birds: add product, price, photograph and contact details • Upload the catalogue online on at least 3 social media platforms	• Enter one week of poultry records into Google Sheets; export as PDF and submit • Prepare profitability analysis for the college farm poultry unit • Record total feed cost, other costs, gross income and net profit for one month • Create a catalogue for college farm organic eggs or live birds: add product, price, photograph and contact details • Upload the catalogue online on at least 3 social media platforms	Nigerian poultry price data, smartphones, field notebooks, etc.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ORGANIC PASTURE, FORAGE AND RUMINANT PRODUCTION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC PASTURE, FORAGE AND RUMINANT PRODUCTION	COURSE CODE: OAT 213	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 the knowledge and practical skills to establish and manage organic pastures, fodder crops and ruminant livestock enterprises in organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the importance of pasture and forage in organic ruminant production;
- 2.0 Know how to establish and manage organic pastures and fodder crop farms;
- 3.0 Understand rotational grazing management in organic ruminant production;
- 4.0 Know how to Manage organic cattle production;
- 5.0 Know how to Manage organic sheep and goat production;
- 6.0 Understand health and welfare management in organic ruminant production systems;
- 7.0 Understand record keeping and marketing in organic ruminant enterprises.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC PASTURE, FORAGE & RUMINANT PRODUCTION	COURSE CODE: OAT 213	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 the knowledge and practical skills to establish and manage organic pastures, fodder crops and ruminant livestock enterprises in organic farming systems.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the importance of pasture and forage in organic ruminant production

1	1.1 Explain the role of pasture and forage in organic ruminant nutrition and production 1.2 Describe major pasture and fodder grass species used in Nigeria (alfalfa, Napier, elephant grass, guinea grass, Rhodes grass and Stylosanthes, etc. 1.3 Describe major leguminous forage species: Leucaena, Gliricidia, lablab, cowpea, etc. 1.4 Explain the nutritive value of common	• Explain the role/importance of pasture grasses and forages using a ruminant nutrition diagram • Describe major grass species with photographs and specimens • Describe major leguminous forage species and explain nitrogen contribution in livestock production • Explain the nutritive value of	Ruminant nutrition diagram/ chart, forage species photographs, forage nutritive value table, forage specimens, projector, marker board, videos. etc.	• Identify ten pasture grasses and forage species on the college farm or nearby • Record species name, type (grasses or legumes), growth habit and palatability rating • Collect forage samples from three species • Estimate dry matter content by sun drying a weighed sample • Record initial fresh weight and dry weight after drying • Visit a ruminant farm with established	Guide students to: • Identify ten pasture grasses and forage species on the college farm or nearby • Record species name, type (grasses or legumes), growth habit and palatability rating • Collect forage samples from three species • Estimate dry matter content by sun drying a weighed sample	Forage identification guide, forage specimens, weighing scale, drying trays, Google app, nearby ruminant farms, observation form, field notebooks, smartphones, PPE, etc.
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	pasture grass and forage species in Nigeria 1.5 Describe the relationship between pasture quality and ruminant performance in organic farming systems	forages using a forage nutritive value table • Discuss pasture grass quality and ruminant performance relationship with relevant farm examples		pasture • Observe grazing behaviour • Record species grazed, time spent on grazing • Estimated pasture cover availability	• Record initial fresh weight and dry weight after drying • Visit a ruminant farm with established pasture • Observe grazing behaviour • Record species grazed, time spent on grazing • Estimated pasture cover availability	
General Objective 2.0: Know how to establish and manage organic pastures and fodder crop farms						
2 – 4	2.1 Describe the steps consider for establishing an organic pasture grass: site selection, land preparation, seed and seed sources or cuttings selection and planting methods 2.2 Explain organic pasture grass maintenance: topping, overseeding, weed management and organic fertilization methods 2.3 Describe the establishment and	• Describe pasture establishment process / procedure steps with a site preparation and planting methods guide • Explain organic pasture grass maintenance with seasonal management examples • Describe cut-and-carry fodder bank establishment with spacing and management guide • Explain step-by-step procedures of making	Pasture grass establishment process / procedure or guide, cut-and-carry fodder bank layout diagram, hay making guide, silage making process / procedure guide, legume integration photographs, videos, projector, marker board, etc.	• Establish a grass fodder plot of at least 10m x 10m on the college farm using cuttings of elephant grass, alfaalfa, napiar or guinea grass • Record spacing, planting date and establishment rate after 2 weeks • Establish a leguminous forage strip alongside the grass fodder plot using Stylosanthes or Leucaena • Record species,	Guide students to: • Establish a grass fodder plot of at least 10m x 10m on the college farm using cuttings of elephant grass, alfaalfa, napiar or guinea grass; • Record spacing, planting date and establishment rate after 2 weeks • Establish a leguminous forage strip alongside the grass fodder plot using Stylosanthes or Leucaena;	Elephant grass or guinea grass cuttings, alfaalfa, napiar, Stylosanthes or Leucaena seed, measuring tape/tools, weighing scale, cutting tools, drying area, storage facility, nearby silage farm, field notebooks, smartphones, transport, etc.

	management of cut-and-carry fodder banks on organic farms 2.4 Explain the conservation of surplus forage: hay making procedure and silage making from organic pasture grasses 2.5 Describe how to integrate leguminous forage into organic pastures grass for nitrogen fixation and improved protein contents	hay and silage Describe legume integration benefits with pasture grass improvement examples from Nigeria		spacing and planting date - Harvest fodder from the established plot at 6 weeks - Record fresh weight per plot, cutting height and re-growth rate after one week - Prepare a hay from available grass on the college farm - Cut at the correct stage, dry and bundle - Record cutting date, drying time, dry weight and storage methods - Visit a farm with silage - Observe the silage making process or storage - Record grass species, stage at cutting, additives used and estimated fermentation quality	- Record species, spacing and planting date - Harvest fodder from the established plot at 6 weeks - Record fresh weight per plot, cutting height and re-growth rate after one week - Prepare a hay from available grass on the college farm - Cut at the correct stage, dry and bundle - Record cutting date, drying time, dry weight and storage methods - Visit a farm with silage - Observe the silage making process or storage - Record grass species, stage at cutting, additives used and estimated fermentation quality	
General Objective 3.0: Understand rotational grazing management in organic ruminant production						
5 – 6	3.1 Define rotational grazing	Discuss rotational grazing and explain	Four-paddock rotation diagram,	Design a four-paddock rotational grazing	Guide students to:	College farm pasture area,

	3.2 Explain its benefits in organic ruminant production: rest periods, pasture recovery and parasite control 3.3 Describe how to design a rotational grazing system: number of paddocks, rotation interval and stocking rate 3.4 Explain how to monitor pasture condition during rotational grazing: cover height, species composition and bare ground percentage 3.5 Describe the role of rotational grazing in organic internal parasite management 3.6 Explain the use of GPS and drone technology to monitor pasture condition and overgrazing	its benefits with Nigerian organic farm examples • Describe paddock design with a four-paddock rotation diagram • Explain pasture condition monitoring with a simple monitoring guide • Describe parasite management role of rotational grazing • Explain GPS and drone use for pasture monitoring with example images	pasture condition monitoring guide, parasite management and rotation relationship diagram, GPS smartphone app, drone or drone footage, projector, video, marker board, etc.	system for a 2-hectare organic pasture: specify paddock size, rotation interval, rest period and stocking rate • Present as a paddock diagram • Monitor pasture condition in two paddocks on the college farm • Record grass height, estimated cover percentage and any bare patches • Compare between a grazed and a rested paddock • Use a GPS smartphone app to measure the area of one pasture paddock on the college farm compare with tape measure calculation • Use drone or drone footage to assess pasture cover and identify any overgrazed or bare zones across the college farm grazing area • Annotate a farm map with findings	• Design a four-paddock rotational grazing system for a 2-hectare organic pasture: specify paddock size, rotation interval, rest period and stocking rate • Present as a paddock diagram • Monitor pasture condition in two paddocks on the college farm • Record grass height, estimated cover percentage and any bare patches • Compare between a grazed and a rested paddock • Use a GPS smartphone app to measure the area of one pasture paddock on the college farm compare with tape measure calculation • Use drone or drone footage to assess pasture cover and identify any overgrazed or bare	paddock design template, pasture monitoring form, GPS smartphone app, drone or drone footage, farm sketch map, measuring tape/tools, field notebooks, etc.
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					zones across the college farm grazing area • Annotate a farm map with findings	
General Objective 4.0: Know how to manage organic cattle production						
7 – 9	4.1 Explain Nigerian cattle breeds suited to organic production systems 4.2 Describe their production characteristics 4.3 Explain housing, grazing and water management for organic cattle 4.4 Describe organic cattle nutrition: pasture grazing, hay, crop residues, mineral supplementation, etc. 4.5 Explain cattle reproduction management in organic systems: heat detection, mating, palpation/ pregnancy detection, calving, etc. 4.6 Describe milk production management for	• Describe Nigerian cattle breeds with photographs and production data • Explain housing, grazing and water management with farm diagrams • Describe organic cattle nutrition with a seasonal feeding guide • Explain reproduction management with a cattle reproductive cycle chart • Describe milking management with hygiene and quality testing procedures	Nigerian cattle breed photographs, cattle housing diagram, seasonal feeding guide, reproductive cycle chart, milking hygiene guide, videos, projector, marker board, etc.	• Carry out body condition scoring on three cattle on the college farm or nearby • Record scores and relate to feeding adequacy • Observe the daily routine of a dairy cow: milking time, feed consumption, water intake and grazing hours • Record observation • Measure milk yield from one dairy cow for three consecutive days; compute average daily yield • Record measurement • Carry out a basic milk quality test: record smell, colour and sediment • Compare with acceptable standards	Guide students to: • Carry out body condition scoring on three cattle on the college farm or nearby; • Record scores and relate to feeding adequacy • Observe the daily routine of a dairy cow: milking time, feed consumption, water intake and grazing hours • Record observation • Measure milk yield from one dairy cow for three consecutive days; compute average daily yield • Record measurement • Carry out a basic milk quality test • Record smell, colour	College farm cattle or nearby cattle farm, body condition scoring chart, milk yield recording form, basic milk quality test equipment, housing and water assessment form, field notebooks, smartphones, PPE, transport, etc.

	organic dairy cattle: milk harvesting process, milk letdown, milking parlour, milking hygiene, milk storage, basic quality testing, etc.			for organic milk Assess the water supply and housing conditions of cattle on the college farm or nearby farm and recommend two improvements	and sediment - Compare with acceptable standards for organic milk - Assess the water supply and housing conditions of cattle on the college farm or nearby farm and recommend two improvements	
General Objective 5.0: Know how to manage organic sheep and goat production						
10 – 11	5.1 Describe Nigerian sheep and goat breeds suited to organic production 5.2 Explain different housing systems, grazing and water management for organic sheep and goats production 5.3 Describe organic feeding of sheep and goats: browse, pasture, hay, crop residues, mineral supplementation etc. 5.4 Explain reproduction management in sheep and goats: heat signs, mating, gestation, kidding or lambing,	- Discuss Nigerian sheep and goat breeds with photographs - Explain housing, grazing and water management for small ruminants - Describe organic feeding with locally available feed materials in Nigeria - Explain reproduction management with a small ruminant reproductive cycle chart - Describe meat and milk production	Sheep and goat breed photographs, housing diagram, small ruminant reproductive cycle chart, organic feeding guide, milk and meat production guide, videos, projector, marker board, etc.	- Carry out a basic health check on three sheep or goats: check eyes, coat, body condition, hooves and signs of respiratory distress - Record findings - Observe and record the grazing and browse behaviour of sheep or goats for one hour; note species grazed, time spent at each plant and any preference shown - Weigh three sheep or goats using a weighing scale or measuring tape/tools	Guide students to: - Carry out a basic health check on three sheep or goats: check eyes, coat, body condition, hooves and signs of respiratory distress - Record findings - Observe and record the grazing and browse behaviour of sheep or goats for one hour; note species grazed, time spent at each plant and any preference shown - Weigh three sheep or goats using a	College farm sheep or goat unit or nearby farm, health check recording form, weighing scale or weighing tape, organic feed materials, feed intake recording form, field notebooks, smartphones, PPE, transport, etc.

	etc. 5.5 Describe organic meat and milk production management for sheep and goats	management with quality requirements		- Record weight, estimated age and body condition score - Prepare and offer an organic feed ration to a group of five goats - Record feed types, quantities offered, quantities refused and time of feeding	weighing scale or measuring tape/tool - Record weight, estimated age and body condition score - Prepare and offer an organic feed ration to a group of five goats - Record feed types, quantities offered, quantities refused and time of feeding	
General Objective 6.0: Understand health and welfare management in organic ruminant production systems						
12 – 13	6.1 Explain health management principles in organic ruminant production: prevention-first approach and conditional use of conventional medicine 6.2 Describe common ruminant diseases in Nigeria and their organic treatment and management systems: worm burden, foot rot, pneumonia, bloat, etc. 6.3 Explain the Five Freedoms of animal welfare and how each applies to organic	- Discuss health management principles using the Nigerian Organic Agriculture Standard - Describe common ruminant diseases with their clinical signs photographs and organic management - Discuss the Five Freedoms and relate each to practical ruminant management - Describe FAMACHA scoring	Nigerian Organic Agriculture Standard, ruminant disease clinical signs photographs, Five Freedoms chart, FAMACHA colour chart, health and welfare record template, projector, marker board, etc.	- Carry out a welfare assessment on the college farm ruminant herd using the Five Freedoms as a checklist - Record score and recommend one improvement for each freedom - Carry out FAMACHA scoring on three sheep or goats on the college farm - Record score for each animal and recommend whether treatment is needed - Observe and record	Guide students to: - Carry out a welfare assessment on the college farm ruminant herd using the Five Freedoms as a checklist - Record score and recommend one improvement for each freedom - Carry out FAMACHA scoring on three sheep or goats on the college farm - Record score for each animal and recommend whether	College farm ruminant herd or nearby farm, Five Freedoms welfare checklist, FAMACHA colour chart, biosecurity assessment form, health and welfare record template, field notebooks, smartphones, PPE, transport, etc.

	ruminant management 6.4 Describe deworming management in organic ruminants: FAMACHA scoring and selective treatment 6.5 Explain record keeping requirements for health and welfare in organic ruminant certification	using colour chart and live animal or photographs Describe health and welfare record keeping requirements		biosecurity measures on the college farm or nearby ruminant farm: footbath, quarantine area and feed storage; note any gaps Complete a health and welfare management record for one week of college farm ruminant observations	treatment is needed - Observe and record biosecurity measures on the college farm or nearby ruminant farm: footbath, quarantine area and feed storage; note any gaps - Complete a health and welfare management record for one week of college farm ruminant observations	
General Objective 7.0: Understand record keeping and marketing in organic ruminant enterprises						
14 – 15	7.1 Explain the records required in certified organic ruminant production: source of animals, feed, health, production, sales records etc. 7.2 Describe how to keep digital ruminant farm records using online tools, e.g. Google Sheets 7.3 Explain marketing of organic ruminant products: live animals, meat, milk, manure,	- Explain required records and walk through each type using sample completed forms - Describe digital record keeping in Google Sheets on a smartphone - Explain marketing channels for organic ruminant products with Nigerian price data - Describe	Sample organic ruminant record forms, smartphones with Google Sheets, Nigerian ruminant product price data, profitability calculation template, projector, videos, marker board, etc.	- Complete a full set of organic ruminant records for one week: fill feed, health, production and sales record templates accurately - Enter one week of ruminant records into Google Sheets - Export as PDF and submit - Prepare a one-page profitability analysis for the college farm	- Complete a full set of organic ruminant records for one week: fill feed, health, production and sales record templates accurately - Enter one week of ruminant records into Google Sheets; export as PDF and submit - Prepare a one-page profitability analysis for the college farm	Organic ruminant record templates, smartphones with Google Sheets, profitability calculation template, Nigerian livestock market price data, local livestock market, field notebooks, transport, etc.

	etc. 7.4 Describe how to calculate the profitability of an organic ruminant enterprise	profitability calculation for a small organic ruminant unit		ruminant unit • Record feed cost, other costs, income and net profit for one month • Visit a local livestock market • Record live animal prices for cattle, sheep and goats • Compare organic and conventional market prices where possible	ruminant unit • Record feed cost, other costs, income and net profit for one month • Visit a local livestock market • Record live animal prices for cattle, sheep and goats • Compare organic and conventional market prices where possible	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

AGROFORESTRY AND REGENERATIVE AGRICULTURE**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: AGROFORESTRY AND REGENERATIVE AGRICULTURE	COURSE CODE: OAT 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 the knowledge and practical skills to design, establish and manage agroforestry systems and apply regenerative agriculture practices.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the concept and types of agroforestry systems;
- 2.0 Know the multipurpose tree species used in agroforestry in Nigeria;
- 3.0 Know how to establish and manage alley cropping and windbreak systems;
- 4.0 Understand silvopastoral systems in organic livestock farming;
- 5.0 Understand regenerative agriculture principles and practices;
- 6.0 Know soil restoration practices in degraded organic farm areas;
- 7.0 Know how to design and document an agroforestry or regenerative agriculture system.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: AGROFORESTRY AND REGENERATIVE AGRICULTURE	COURSE CODE: OAT 214	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE: OAT 116	PRACTICAL: 2 HOURS/WEEK

COURSE SPECIFICATION: THEORETICAL AND PRACTICAL

GOAL: This course is designed to equip students with the knowledge and practical skills to design, establish and manage agroforestry systems and apply regenerative agriculture practices.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the concept and types of agroforestry systems

1 – 2	1.1 Define agroforestry 1.2 Explain agroforestry importance in organic farming: soil fertility, biodiversity, climate resilience and income diversification 1.3 Describe the main types of agroforestry systems: alley cropping, windbreaks, parkland systems, home gardens, taungya and silvopastoral systems 1.4 Explain the benefits of each agroforestry system type for organic farmers in	• Define agroforestry and explain importance with Nigerian organic farm examples • Describe each system type with diagrams and photographs • Explain benefits of each type with documented Nigerian farm data • Describe existing Nigerian agroforestry systems with	Agroforestry system type diagrams, Nigerian agroforestry photographs, ICRAF agroforestry benefits data, projector, video, marker board, etc.	• Identify at least two agroforestry system types on the college farm or a nearby farm • Sketch the identified agroforestry system types on the college farm or a nearby farm; record species composition, crop and tree arrangement and observed benefits • Interview a farmer who uses a traditional agroforestry system • Record the tree species used, management practices and perceived benefits; present findings to the class	Guide students to: • Identify at least two agroforestry system types on the college farm or a nearby farm • Sketch the identified agroforestry system types on the college farm or a nearby farm; record species composition, crop and tree arrangement and observed benefits • Interview a farmer who uses a traditional agroforestry system; • Record the tree species used,	College farm or nearby agroforestry farm, sketch template, farmer interview guide, drone or drone footage, field notebooks, transport, PPE, etc.
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	Nigeria 1.5 Describe existing agroforestry systems practised by smallholder farmers in Nigeria: parkland shea and faidherbia systems in the north and home gardens in the south 1.6 Explain how agroforestry supports organic certification by providing natural inputs and ecosystem services	regional examples • Explain agroforestry role in organic certification support		• Use drone or drone footage to observe tree and crop arrangement on a nearby farm from above; classify the system type and record canopy coverage percentage	management practices and perceived benefits; present findings to the class • Use drone or drone footage to observe tree and crop arrangement on a nearby farm from above; classify the system type and record canopy coverage percentage	
General Objective 2.0: Know the multipurpose tree species used in agroforestry in Nigeria						
3 – 4	2.1 Describe major multipurpose tree species used in agroforestry in Nigeria: <i>Gliricidia sepium</i>, <i>Leucaena leucocephala</i>, <i>Faidherbia albida</i>, <i>Parkia biglobosa</i>, <i>Vitellaria paradoxa</i>, <i>Moringa oleifera</i>, etc. 2.2 Explain the specific uses of each species: nitrogen fixation, fodder, timber, food, medicine and shade 2.3 Describe the	• Describe the profile of each tree species using photographs, specimens and published data sheets • Explain specific uses of each species with Nigerian examples • Describe establishment requirements for each species • Discuss the	Multipurpose tree species profile cards, specimens and photographs, establishment guide, tree identification key, pruning and pollarding diagrams, projector, videos, marker board, etc.	• Identify at least five multipurpose tree species on the college farm or nearby • Record species name, identification features, main uses and any visible management • Collect specimens from any three tree species: press or photograph leaf, bark, pod or flower • Prepare labelled specimen cards for each • Carry out pruning or pollarding on one	Guide students to: • Identify at least five multipurpose tree species on the college farm or nearby • Record species name, identification features, main uses and any visible management • Collect specimens from any three tree species: press or photograph leaf, bark, pod or flower	College farm trees or nearby farm, specimen press, camera, species profile cards, tree identification key, pruning saw or secateurs, multipurpose tree seedlings, measuring tape/tools, field notebooks, smartphones, PPE, etc.

	establishment requirements of each species: planting method, spacing, season and soil preference 2.4 Explain how to identify each tree species by leaf, bark, pod and flower 2.5 Describe the management of established multipurpose trees: pruning, pollarding, coppicing, etc.	identification of species by morphological features • Explain pruning, pollarding and coppicing with illustrated diagrams		established multipurpose tree on the college farm • Record tree species, pruning method, height pruned to, date and reason for pruning • Plant seedlings of two multipurpose tree species on the college farm • Record species, planting method, spacing, date and water requirements after planting	• Prepare labelled specimen cards for each • Carry out pruning or pollarding on one established multipurpose tree on the college farm • Record tree species, pruning method, height pruned to, date and reason for pruning • Plant seedlings of two multipurpose tree species on the college farm • Record species, planting method, spacing, date and water requirements after planting	
General Objective 3.0: Know how to establish and manage alley cropping and windbreak systems						
5 – 6	3.1 Describe alley cropping: definition, tree species used, alley width, row spacing and crop species planted between rows 3.2 Explain the management of established alley	• Describe alley cropping with a diagram showing tree rows and crop alleys • Discuss alley crop management including pruning frequency and	Alley cropping layout diagram, windbreak layout diagram, pruning management guide, monitoring indicator table, videos, projector, marker board, etc.	• Establish an alley cropping strip on the college farm of at least 20m in length: plant Gliricidia or Leucaena at 0.5m within-row spacing in two rows 4m apart; plant a food crop in the alley • Record establishment	• Establish an alley cropping strip on the college farm of at least 20m in length: plant Gliricidia or Leucaena at 0.5m within-row spacing in two rows 4m apart; plant a food	Gliricidia or Leucaena cuttings, food crop seeds, multipurpose tree seedlings for windbreak, measuring tape, pruning tools, weighing scale,

	cropping: pruning frequency, pruning height and incorporation of prunings as mulch or green manure 3.3 Explain the establishment of a windbreak: species selection, row arrangement, spacing and orientation relative to prevailing wind 3.4 Describe the management of established windbreaks: maintenance pruning and gap filling 3.5 Explain how to monitor the effect of alley cropping and windbreaks on soil fertility and crop yield	mulch or green manure incorporation • Explain windbreak establishment with a layout diagram showing row arrangement and prevailing wind direction • Describe windbreak maintenance and gap filling procedures • Explain monitoring indicators for alley cropping and windbreak performance		details • Carry out the first pruning of an established alley crop row • Record tree species, height pruned to, fresh biomass weight and method of incorporating prunings into the soil • Establish a windbreak of at least 15 trees on the windward side of a college farm plot; record species, spacing, row arrangement and planting date • Monitor the effect of the alley crop on soil moisture and weed density in the alley and in an adjacent unshaded plot • Record and compare results • Use drone or drone footage to assess the alignment and establishment of the alley crop strip and windbreak from above • Annotate a farm map with observations	crop in the alley • Record establishment details • Carry out the first pruning of an established alley crop row • Record tree species, height pruned to, fresh biomass weight and method of incorporating prunings into the soil • Establish a windbreak of at least 15 trees on the windward side of a college farm plot • Record species, spacing, row arrangement and planting date • Monitor the effect of the alley crop on soil moisture and weed density in the alley and in an adjacent unshaded plot • Record and compare results • Use drone or drone footage to assess the alignment and	moisture meter, drone or drone footage, farm sketch map, college farm plots, smartphones, PPE, etc.
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					establishment of the alley crop strip and windbreak from above Annotate a farm map with observations	
General Objective 4.0: Understand silvopastoral systems in organic livestock farming						
7 – 8	4.1 Define silvopastoral systems. 4.2 Explain the benefits of silvopastoral systems for organic livestock production: shade, fodder trees, nitrogen enrichment and carbon storage 4.3 Describe how to design a silvopastoral system: tree species, spacing, pasture species and livestock type 4.4 Explain the management of trees in silvopastoral systems: pollarding for fodder, rotational access and water point management 4.5 Describe the effect of silvopastoral systems on animal productivity:	- Define silvopastoral systems and explain benefits with Nigerian and regional examples - Describe system design with a silvopastoral layout diagram - Explain tree management in silvopastoral systems with pollarding guide - Describe animal productivity benefits of silvopastoral systems with data from research and farmer experience - Explain climate	Silvopastoral system layout diagram, pollarding guide, animal productivity data, climate adaptation photographs, videos, projector, marker board, etc.	- Design a silvopastoral system for a 1-hectare organic farm: specify tree species, tree spacing, pasture species and livestock type - Draw a layout diagram of the system - Establish a small silvopastoral demonstration plot on the college farm: plant at least five multipurpose tree seedlings in a pasture or grazing area - Record species, spacing and planting date - Observe livestock behaviour in a shaded and an unshaded grazing area on the college farm or nearby farm; record time spent in shade, feeding behaviour and any visible signs of heat stress	- Design a silvopastoral system for a 1-hectare organic farm: specify tree species, tree spacing, pasture species and livestock type - Draw a layout diagram of the system - Establish a small silvopastoral demonstration plot on the college farm: plant at least five multipurpose tree seedlings in a pasture or grazing area; record species, spacing and planting date - Observe livestock behaviour in a shaded and an unshaded grazing	Silvopastoral design template, multipurpose tree seedlings, measuring tape, weighing scale, livestock behaviour observation form, pruning tools, college farm or nearby silvopastoral farm, smartphone, field notebooks, transport, PPE, etc.

	improved weight gain, milk yield and reduced heat stress 4.6 Explain the climate adaptation value of silvopastoral systems for organic ruminant production in Nigeria	adaptation value with heat stress reduction examples		• Pollard or prune one fodder tree in the silvopastoral area; collect and weigh fresh fodder • Offer to livestock and record feed intake and animal response	area on the college farm or nearby farm • Record time spent in shade, feeding behaviour and any visible signs of heat stress • Pollard or prune one fodder tree in the silvopastoral area • Collect and weigh fresh fodder; offer to livestock and record feed intake and animal response	
General Objective 5.0: Understand regenerative agriculture principles and practices						
9-10	5.1 Define regenerative agriculture 5.2 Describe the five principles of regenerative agriculture: minimise soil disturbance, maintain soil cover, maximise biodiversity, keep living roots, integrate livestock, etc. 5.3 Explain how regenerative agriculture contributes to organic farming: soil	• Explain regenerative agriculture and contrast with conventional farming • Describe the five principles of regenerative agriculture with practical farm examples for each • Explain ecological outcome	Regenerative agriculture principles chart, Nigerian regenerative practice photographs, research data on regenerative outcomes, videos, projector, marker board, etc.	• Assess the college farm against the five regenerative agriculture principles: score each principle (0–3) and identify two areas where the farm can improve • Compare a regeneratively managed plot and a conventionally managed plot on the college farm • Measure and compare soil cover percentage, earthworm count and weed diversity • Prepare a plan proposing	Guide students to: • Assess the college farm against the five regenerative agriculture principles: score each principle (0–3) and identify two areas where the farm can improve • Compare a regeneratively managed plot and a conventionally managed plot on the college farm	Regenerative agriculture assessment scorecard, college farm plots, earthworm count equipment, soil cover assessment guide, plan template, farmer interview guide, field notebooks, videos, smartphone, transport, PPE,

	restoration, biodiversity rebuilding, carbon sequestration, etc. 5.4 Describe regenerative agriculture practices used in Nigeria: agroforestry, cover cropping, rotational grazing and composting 5.5 Explain the global and national context of regenerative agriculture: growing interest from buyers, certification bodies and development programmes	differences using research data from Nigerian farms - Describe regenerative practices used in Nigeria with photographs - Explain global and national context briefly using recent programme examples		three regenerative practices the college farm should adopt: specify what to do, when to do it and expected benefit for each - Interview a farmer practising agroforestry or any regenerative agricultural practice - Record their experience, challenges and perceived benefits; present findings to the class	- Measure and compare soil cover percentage, earthworm count and weed diversity - Prepare a plan proposing three regenerative practices the college farm should adopt: specify what to do, when to do it and expected benefit for each - Interview a farmer practising agroforestry or any regenerative agricultural practice - Record their experience, challenges and perceived benefits - Present findings to the class	etc.
General Objective 6.0: Know soil restoration practices in degraded organic farm areas						
11-13	6.1 Explain soil degradation and its indicators on organic farms: compaction, bare ground, low earthworm count, erosion rills, low crop	- Explain soil degradation indicators with field photographs from Nigeria - Describe each soil	Soil degradation indicator photographs, soil restoration practice guide, degraded land assessment form, FMNR case	Identify soil degradation indicators on the college farm or a degraded nearby area: record compaction, bare ground, erosion, low earthworm count, low plant	Guide students to: Identify soil degradation indicators on the college farm or a degraded nearby area: record	Compost, cover crop seeds, multipurpose tree seedlings, degraded plot on college farm, earthworm count

	yields, etc. 6.2 Describe soil restoration practices for degraded land: composting, deep tillage to break compaction, tree planting, cover cropping and water harvesting structures 6.3 Explain how to prioritise soil restoration activities on a degraded farm plot 6.4 Describe how farmer-managed natural regeneration (FMNR) is used for land restoration in Northern Nigeria 6.5 Explain how to monitor and document soil restoration progress using simple field indicators	restoration practice with practical examples • Explain prioritisation of restoration activities using a degraded land assessment form • Describe FMNR with case studies from Northern Nigeria • Explain how to monitor restoration progress using soil health indicators	studies, soil health monitoring guide, videos, projector, marker board, etc.	diversity, etc. • Document the soil degradation indicators identified. • Carry out three soil restoration activities on a degraded plot on the college farm • Apply compost, establish a cover crop and plant two multipurpose trees • Record all activities and materials used • Assess the soil health of the restored plot after four weeks using three indicators: earthworm count, soil moisture and plant cover percentage • Compare with an unrestored control plot • Identify trees regenerating naturally in a degraded area on or near the college farm • Record species, height and whether they should be protected as FMNR candidates • Use drone or drone footage to map the extent of degraded areas on the college farm or a nearby	compaction, bare ground, erosion, low earthworm count, low plant diversity, etc. • Document the soil degradation indicators identified. • Carry out three soil restoration activities on a degraded plot on the college farm • Apply compost, establish a cover crop and plant two multipurpose trees • Record all activities and materials used • Assess the soil health of the restored plot after four weeks using three indicators: earthworm count, soil moisture and plant cover percentage • Compare with an unrestored control plot • Identify trees regenerating naturally in a degraded area on or near the college farm • Record species, height and whether they	equipment, soil moisture meter, drone or drone footage, farm sketch map, videos, smartphone, field notebooks, PPE, etc.
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				farm • Annotate a farm sketch map with the degradation zones and proposed restoration zones	should be protected as FMNR candidates • Use drone or drone footage to map the extent of degraded areas on the college farm or a nearby farm • Annotate a farm sketch map with the degradation zones and proposed restoration zones	
General Objective 7.0: Know how to design and document an agroforestry and regenerative agriculture system						
14-15	7.1 Explain the steps in designing an agroforestry and regenerative agriculture system for a given farm 7.2 Describe how to document an agroforestry and regenerative agriculture system for organic certification 7.3 Explain how to present an agroforestry and regenerative design to a farmer or certification inspector 7.4 Describe how to use drone imagery and	• Discuss agroforestry and regenerative system design steps using a sample design document • Explain documentation requirements for organic certification of agroforestry systems • Explain how to present a design clearly to non-technical audiences	Sample agroforestry system design document, organic certification documentation guide, GPS smartphone app, drone or drone footage, projector, videos, marker board, etc.	• Design a complete agroforestry system for the college farm or a 2-hectare sample farm: specify tree species, crop species, system type, layout, establishment schedule and expected benefits • Present as a labelled diagram • Document the agroforestry practices established on the college farm during this course • Prepare a record of tree species planted, areas covered, dates and materials used; organise into a certification-ready	• Design a complete agroforestry system for the college farm or a 2-hectare sample farm: specify tree species, crop species, system type, layout, establishment schedule and expected benefits • Present as a labelled diagram • Document the agroforestry practices established on the college farm during this course • Prepare a record of tree species planted,	Agroforestry design template, certification documentation folder, GPS smartphone app, drone or drone footage, farm sketch map, presentation rubric, projector, field notebooks, PPE, etc.

	GPS mapping to document a designed agroforestry system	Describe how drone imagery and GPS are used to document and verify agroforestry system layout		folder - Use a GPS smartphone app to map all agroforestry features established on the college farm - Record coordinates of each tree row, windbreak and silvopastoral area - Plot on a farm sketch map - Ppresent the agroforestry system design to the class using the farm map and species list - Respond to at least two questions from peers and the lecturer - Use drone or drone footage to take a final aerial photograph of the college farm agroforestry area - Annotate with species locations and compare with the design plan	areas covered, dates and materials used; organise into a certification-ready folder - Use a GPS smartphone app to map all agroforestry features established on the college farm - Record coordinates of each tree row, windbreak and silvopastoral area - Plot on a farm sketch map - Ppresent the agroforestry system design to the class using the farm map and species list - Respond to at least two questions from peers and the lecturer - Use drone or drone footage to take a final aerial photograph of the college farm agroforestry area - Annotate with species locations and compare with the	
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design plan

COURSE ASSESSMENT:

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



ORGANIC FISHERIES AND AQUACULTURE PRODUCTION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC FISHERIES AND AQUACULTURE PRODUCTION	COURSE CODE: OAT 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 the knowledge and practical skills to manage organic fisheries and aquaculture enterprises in an integrated organic farming systems.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the importance of fisheries and aquaculture in organic farming systems;
- 2.0 Understand the principles of organic aquaculture production;
- 3.0 Know how to establish and manage an organic fish pond;
- 4.0 Understand organic nutrition and feeding management for fish;
- 5.0 Know health and water quality management in organic aquaculture;
- 6.0 Know how to harvest, process and market organic fish products;
- 7.0 Understand record keeping in organic fisheries and aquaculture enterprises.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC FISHERIES AND AQUACULTURE PRODUCTION	COURSE CODE: OAT 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 the knowledge and practical skills to manage organic fisheries and aquaculture enterprises in an integrated organic farming systems.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the importance of fisheries and aquaculture in organic farming systems

1	1.1 Explain the importance of fish in Nigerian food security and nutrition 1.2 Describe the status of fisheries production in Nigeria: artisanal, aquaculture and industrial 1.3 Explain the role of aquaculture in organic integrated farming: fish pond effluent for crop fertilisation, aquaponics and	• Discuss the importance of fish in Nigerian nutrition and food security with production data • Describe fisheries status in Nigeria using FMA&FS and FAO fisheries data • Explain integrated fish farming role with photographs of rice-fish and aquaponic systems • Discuss major cultured fish species with photographs and production data	FMA&FS fisheries production data, FAO aquaculture data, integrated fish farming photographs, fish species photographs, organic fish market price data, projector, videos, marker board, etc.	• Visit a fish farm or fish market; • Record fish species present, farming method used, fish prices and any labelling of organic or sustainable fish • Identify major cultured fish species from live samples or photographs • Record species name, local name, preferred habitat and marketability • Prepare market brief for one organic fish species • Record current farm gate price, market price and	Guide students to: • Visit a fish farm or fish market; • Record fish species present, farming method used, fish prices and any labelling of organic or sustainable fish • Identify major cultured fish species from live samples or photographs • Record species name, local name, preferred habitat and marketability • Prepare market brief for one organic fish species: • Record current farm gate	Nearby fish farm or fish market, fish species photographs or samples, market brief template, observation form, smartphones, PPE, etc.
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	integrated rice-fish production 1.4 State major fish species cultured in Nigeria: catfish, tilapia and carp 1.5 Explain the growing demand for organic and sustainably produced fish in Nigeria and export markets	Explain market demand for organic fish with price and trade data		potential income for a 0.1-hectare fish pond	price, market price and potential income for a 0.1-hectare fish pond	
General Objective 2.0: Understand the principles of organic aquaculture production						
2 – 3	2.1 Define organic aquaculture 2.2 Explain how it differs from conventional aquaculture 2.3 Describe the principles of organic aquaculture: natural feed, no synthetic chemicals, low stocking density, access to natural environment, animal welfare, etc. 2.4 Explain the prohibited inputs in organic	- Explain organic aquaculture and compare with conventional using a table - Describe organic aquaculture principles with farm examples from Nigeria and globally - Explain prohibited inputs using the IFOAM organic aquaculture standard - Describe existing standards at awareness level using a standards comparison chart	Organic vs conventional aquaculture comparison table, IFOAM organic aquaculture standard, standards comparison chart, certification process flowchart, projector, marker board, etc.	- Compare organic and conventional aquaculture management using a structured comparison table - Record feed type, stocking density, botanical use, welfare and certification cost for each - Identify the IFOAM/NAOS standard section on prohibited inputs - Identify the ten most important prohibited substances and explain	Guide students to: - Compare organic and conventional aquaculture management using a structured comparison table - Record feed type, stocking density, botanical use, welfare and certification cost for each - Identify the IFOAM/NAOS standard section on prohibited inputs - Identify the ten most important prohibited substances and explain	Organic vs conventional aquaculture comparison table template, IFOAM organic aquaculture standard, certification checklist template, field notebooks, smartphones, PPE, etc.

	aquaculture: synthetic hormones, prophylactic antibiotics, synthetic feed additives and synthetic colourants 2.5 Describe existing organic aquaculture standards: IFOAM, NOP, BIOSWISS, JAS, EU Organic Aquaculture Regulations and national standards, etc. 2.6 Explain the certification process for organic aquaculture production	Explain certification process for organic aquaculture using a simple flowchart		why each is prohibited Prepare a mock organic aquaculture certification checklist for a 0.1-hectare catfish pond: list the documentation and management requirements needed before applying for certification	why each is prohibited Prepare a mock organic aquaculture certification checklist for a 0.1-hectare catfish pond: list the documentation and management requirements needed before applying for certification	
General Objective 3.0: Know how to establish and manage an organic fish pond						
4 – 6	3.1 Describe types of fish ponds used in organic aquaculture in Nigeria: earthen ponds, concrete tanks, plastic tanks, etc. 3.2 Explain site selection for an	- Discuss fish pond types with photographs and diagrams - Explain site selection with a site suitability checklist - Describe earthen pond construction with a cross-section diagram	Fish pond type diagrams, site suitability checklist, earthen pond cross-section diagram, pond preparation guide,	- Assess the college farm fish pond or a nearby pond using a site suitability checklist - Record water source, soil type, slope, area and any concerns - Carry out pond preparation on the	Guide students to: - Assess the college farm fish pond or a nearby pond using a site suitability checklist - Record water source, soil type, slope, area and any concerns - Carry out pond	College farm fish pond or nearby pond, site suitability checklist, lime, organic manure, weighing scale, fish fingerlings, GPS smartphone

	organic fish pond: water source, soil type, slope, proximity to crop fields, access, etc. 3.3 Describe earthen pond construction: excavation, embankment, inlet, outlet and water control structures 3.4 Explain pond preparation before stocking: liming, fertilisation with organic manure and filling 3.5 Describe stocking of organic fish ponds: species selection, stocking density and fingerling quality assessment	• Explain pond preparation before stocking with a preparation procedure guide • Describe stocking with stocking density guide and fingerling quality criteria	stocking density guide, fingerlings quality assessment guide, projector, marker board, etc.	college farm pond before stocking: apply lime and organic manure; • Record quantities used, date and method • Stock the college farm fish pond with fingerlings: • Record species, source, number stocked, stocking density per m² and initial mean weight • Use a GPS smartphone app to measure the area of the college farm fish pond • Record the coordinates of the pond boundary points on a farm map	preparation on the college farm pond before stocking: apply lime and organic manure; • Record quantities used, date and method • Stock the college farm fish pond with fingerlings: • Record species, source, number stocked, stocking density per m² and initial mean weight • Use a GPS smartphone app to measure the area of the college farm fish pond • Record the coordinates of the pond boundary points on a farm map	app, farm map template, field notebooks, PPE, etc.
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General Objective 4.0: Understand organic nutrition and feeding management for fish

7 – 9	4.1 Explain the nutritional requirements of cultured fish in organic systems: protein, energy, vitamins and minerals	• Discuss fish nutritional requirements using a simple nutrient requirement table • Discuss allowed organic feed ingredients with examples available in Nigeria	Fish nutrient requirement table, allowed organic feed ingredient list, feed preparation guide, feeding	• Prepare a simple organic fish feed using locally available ingredients: weigh each ingredient, mix and form pellets or crumbles • Record formulation and moisture content	Guide students to: • Prepare a simple organic fish feed using locally available ingredients: weigh each ingredient, mix and form pellets or crumbles • Record formulation and	Locally available feed ingredients, weighing scale, mixing containers, pellet press or manual forming tools,
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4.2 Describe the allowed organic feed ingredients for fish: fish meal from sustainable fisheries, soybean meal, duckweed, black soldier fly larvae and agricultural by-products 4.3 Explain how to prepare a simple organic fish feed using locally available ingredients (60% organic raw materials) 4.4 Describe feeding management for organic fish: feeding frequency, feeding rate and feed size by fish stage 4.5 Explain how to monitor feed consumption and adjust feeding rate / period based on fish behaviour and growth	• Describe simple organic fish feed preparation using locally available materials • Describe feeding management with a feeding rate guide by fish size, stage and population • Explain feed consumption monitoring and adjustment based on fish behaviour	rate table, feed consumption monitoring form, projector, marker board, etc.	• Feed fish in the college farm pond at the recommended rate • Record quantity offered, feeding time, fish response and any uneaten feed remaining after 30 minutes • Adjust feeding rate / period based on observed fish behaviour and growth • Record the original rate, observation made and adjusted rate • Grow duckweed on the college farm water body as a live organic fish feed supplement • Record establishment date, growth rate and daily harvest weight	moisture content • Feed fish in the college farm pond at the recommended rate • Record quantity offered, feeding time, fish response and any uneaten feed remaining after 30 minutes • Adjust feeding rate / period based on observed fish behaviour and growth • Record the original rate, observation made and adjusted rate • Grow duckweed on the college farm water body as a live organic fish feed supplement • Record establishment date, growth rate and daily harvest weight	duckweed starter culture, duckweed tray, feed monitoring form, field notebooks, smartphones, PPE, etc.
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General Objective 5.0: Know health and water quality management in organic aquaculture

10 – 11	5.1 Explain the importance of water quality in organic aquaculture: pH, dissolved oxygen, ammonia and turbidity 5.2 Describe how to test and maintain water quality in an organic fish pond 5.3 List common fish diseases and health problems in organic aquaculture and describe their organic management 5.4 Explain biosecurity measures in organic fish ponds: predator exclusion, visitor control and quarantine of new fish 5.5 Describe the health monitoring indicators for fish in organic ponds: feeding behaviour,	• Explain water quality parameters using a water quality reference table for fish production • Discuss water quality testing and maintenance methods with demonstration on the pond • Describe common fish diseases with clinical sign photographs and organic treatment management options • Explain biosecurity measures for organic fish ponds • Describe health monitoring indicators and demonstrate observation on the college farm pond	Water quality reference table for fish, water quality test kit, fish disease photographs, biosecurity guide, fish health monitoring observation form, projector, marker board, videos, etc.	• Test water quality in the college farm fish pond: measure pH, dissolved oxygen, temperature and turbidity • Record results and compare with acceptable ranges for catfish or tilapia production • Observe the health and behaviour of fish in the college farm pond for 15 minutes • Record feeding behaviour, surface activity, discolouration and mortality • Recommend an action if a problem is identified • Carry out a biosecurity inspection of the college farm fish pond • Record predator exclusion measures, water inlet screening, visitor control and quarantine procedures • Recommend improvements • Apply lime to adjust the	Guide students to: • Test water quality in the college farm fish pond: measure pH, dissolved oxygen, temperature and turbidity • Record results and compare with acceptable ranges for catfish or tilapia production • Observe the health and behaviour of fish in the college farm pond for 15 minutes • Record feeding behaviour, surface activity, discolouration and mortality • Recommend an action if a problem is identified • Carry out a biosecurity inspection of the college farm fish pond • Record predator exclusion measures, water inlet screening, visitor control and quarantine procedures • Recommend improvements • Apply lime to adjust the	Water quality test kit, thermometer, lime for pH adjustment, college farm fish pond, biosecurity inspection form, fish health observation form, measuring containers, smartphones, weighing scale, field notebooks, etc.
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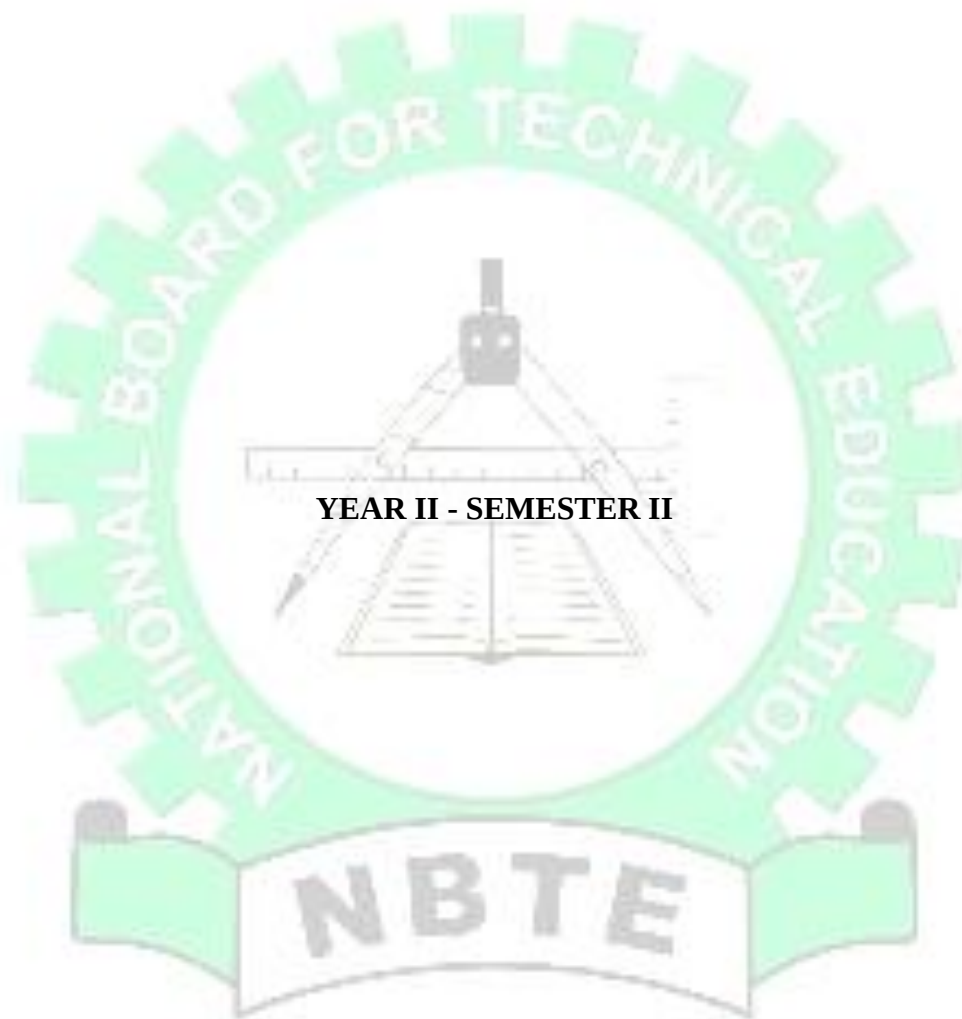
	surface gulping, discolouration and mortality rate			pH of a pond sample that tests below the acceptable range • Calculate the quantity needed • Record the calculation, application method and pH after treatment	pH of a pond sample that tests below the acceptable range • Calculate the quantity needed • Record the calculation, application method and pH after treatment	
General Objective 6.0: Know how to harvest, process and market organic fish products						
12 – 13	6.1 Explain how to determine harvest readiness in organic fish ponds: target market size, feeding rate drop and net sampling 6.2 Describe harvesting methods for organic fish ponds: seining, drain harvesting and cast net 6.3 Explain primary processing of organic fish: killing, gutting, washing and icing for fresh fish; smoking and sun drying for preserved fish 6.4 Describe packaging and labelling of	• Discuss fish readiness to harvest and demonstrate net sampling • Describe harvesting methods with photographs of each method used in Nigeria • Explain primary processing with a step-by-step procedure for fresh, smoked and dried fish • Describe packaging and labelling requirements for organic fish products • Describe marketing channels for organic fish in Nigeria with price data	Net sampling guide, harvesting method photographs, fish processing step-by-step guide, packaging materials, label template, Nigerian fish market price data, projector, marker board, videos, etc.	• Carry out a net sampling of the college farm fish pond • Record number sampled, mean weight and estimated total pond biomass • Determine whether harvest is appropriate • Harvest fish from the college farm pond using an appropriate method • Record total weight harvested, number of fish and mean weight per fish • Process a sample of harvested fish: gut, wash and prepare for fresh sale • Record procedure, time taken and final product weight	Guide students to: • Carry out a net sampling of the college farm fish pond • Record number sampled, mean weight and estimated total pond biomass • Determine whether harvest is appropriate • Harvest fish from the college farm pond using an appropriate method • Record total weight harvested, number of fish and mean weight per fish • Process a sample of harvested fish: gut, wash and prepare for fresh sale • Record procedure, time taken and final product weight	Cast net or seine net, harvest basins, weighing scale, gutting knives, washing basins, packaging materials, label template, cost-benefit template, college farm fish pond, PPE, smartphones, field notebooks, etc.

	organic fish products: fresh, smoked and dried 6.5 Explain marketing of organic fish using digital tools: live fish, fresh fish, smoked fish and dried fish — price, buyers and delivery			• Package fresh organic fish • Label fresh organic fish • Record weight, fish species, farm name, processing date and handling instructions on the label • Prepare a simple cost-benefit analysis for the college farm fish pond • Record total production cost, fish weight harvested and income at current market price	• Package fresh organic fish • Label fresh organic fish • Record weight, fish species, farm name, processing date and handling instructions on the label • Prepare a simple cost-benefit analysis for the college farm fish pond • Record total production cost, fish weight harvested and income at current market price	
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General Objective 7.0: Understand record keeping in organic fisheries and aquaculture enterprises

14 – 15	7.1 Explain the records required in certified organic aquaculture: production record, stocking records, feed records, water quality records, health records and harvest records, sales records. 7.2 Describe how to keep digital fish farm records using appropriate digital tool, e.g Google	• Explain required records and walk through each type using sample completed forms • Describe digital record keeping in Google Sheets on a smartphone • Describe profitability calculation for a 0.1-hectare organic catfish pond • Explain WhatsApp Business marketing for organic fish with Nigerian examples	Sample organic aquaculture record forms, smartphones with Google Sheets, profitability calculation template, WhatsApp Business guide, video, Nigerian fish market price data, projector,	• Complete a full set of organic aquaculture records for one week of college farm pond management: fill stocking, feed, water quality and health record templates • Enter one week of fish farm records into Google Sheets; export as PDF and submit • Prepare a profitability analysis for the college farm fish pond: • Record stocking cost,	Guide students to: • Complete a full set of organic aquaculture records for one week of college farm pond management: fill stocking, feed, water quality and health record templates • Enter one week of fish farm records into Google Sheets; export as PDF and submit • Prepare a profitability analysis for the college farm fish pond:	Organic aquaculture record templates, smartphones with Google Sheets and WhatsApp Business, profitability calculation template, Nigerian fish market price data, field notebooks, PPE, etc.
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	Sheets 7.3 Explain how to calculate the profitability of an organic fish pond enterprise 7.4 Describe the process to market organic aquaculture products using WhatsApp Business and local networks		marker board, etc.	feed cost, other costs, income from harvest and net profit • Create a WhatsApp Business catalogue for organic fish products from the college farm: add product type, price per kg, availability and contact details	• Record stocking cost, feed cost, other costs, income from harvest and net profit • Create a WhatsApp Business catalogue for organic fish products from the college farm: add product type, price per kg, availability and contact details	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						



YEAR II - SEMESTER II

ORGANIC ANNUAL CROP PRODUCTION**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC ANNUAL CROP PRODUCTION	COURSE CODE: OAT 221	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 the knowledge and practical skills to produce and manage major annual crops in organic farming.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Know the scope and classification of annual crops in organic system in Nigeria;
- 2.0 Understand cereal crop production in organic system;
- 3.0 Know legume crop production in organic system;
- 4.0 Understand root and tuber crop production in organic system;
- 5.0 Understand harvesting, post-harvest handling and record keeping for organic annual crops.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC ANNUAL CROP PRODUCTION	COURSE CODE: OAT 221	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

This course is designed to equip students with the knowledge and practical skills to produce and manage major annual crops in organic farming

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Know the scope and classification of annual crops in organic system in Nigeria

1-3	1.1 Define annual crops. 1.2 Explain their importance in organic agriculture in Nigeria 1.3 Explain the classification of annual crops into cereals, legumes, root and tuber crops and annual vegetables 1.4 Identify the major organic annual crops produced in Nigeria and their ecological zones of production 1.5 Explain the growing demand for organically produced annual crops in	• Define annual crops and explain the importance organic agriculture using Nigerian production data • Explain annual crops using a chart and crop samples or photographs • Explain the major organic annual crops by zone using Nigeria agro-ecological zone map • Discuss the growing demand for organically produced annual	Nigeria agro-ecological zone map, annual crop classification chart, crop samples or photographs, Nigerian organic market price data, projector, marker board, etc.	• Identify 15 annual crops from samples or photographs • Record crop name, classification (cereal, legume, root crop or vegetable), growing zone and one key market use for each • Visit a local market; identify organic annual crop products • Record crops sold, prices and compare with conventional equivalents • Prepare a seasonal crop calendar for five major annual crops suited to the local ecological zone in	Guide students to: • Identify 15 annual crops from samples or photographs • Record crop name, classification (cereal, legume, root crop or vegetable), growing zone and one key market use for each • Visit a local market; identify organic annual crop products • Record crops sold, prices and compare with conventional equivalents • Prepare a seasonal crop calendar for five major annual crops suited to	Annual crop samples or photo cards, local market, price recording sheet, seasonal crop calendar template, field notebooks, transport, smartphones, PPE, etc.
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	Nigeria and export markets 1.6 Describe the general agronomic requirements for producing annual crops in organic systems	crops in Nigeria and export markets • Explain general agronomic requirements for annual crop production in organic systems		organic system • Record planting season, duration and harvest window for each	the local ecological zone in organic system • Record planting season, duration and harvest window for each	
General Objective 2.0: Understand cereal crop production in organic system						
4-6	2.1 Describe the major cereal crops grown in Nigeria: maize, sorghum, millet, rice, wheat, etc. 2.2 Explain the agronomic requirements of each cereal: climate, soil, season and variety selection 2.3 Describe land preparation, planting (spacing, seed rate, planting method) and seedbed requirements for organic cereal production 2.4 Explain organic soil fertility management for cereals: compost application, green	• Explain each major cereal crops grown in Nigeria using photographs and production data • Discuss the agronomic requirements of each cereal: climate, soil, season and variety selection • Discuss land preparation and planting with spacing and seed rate tables • Discuss organic fertility management for cereals with Nigerian farm examples	Cereal crop photographs, crop production guides, spacing and seed rate table, organic fertility management guide, weed and pest management chart, projector, marker board, etc.	• Plant a maize or sorghum plot on the college farm using correct spacing • Record seedbed preparation, planting date, spacing and germination after 7 days • Apply compost to the cereal plot at the recommended rate before planting • Record quantity applied, area covered and application method • Monitor the cereal plot weekly for three weeks • Record plant height, leaf colour, weed pressure and any pest or disease signs • Present findings in a monitoring table • Carry out manual weeding	Guide students to: • Plant a maize or sorghum plot on the college farm using correct spacing • Record seedbed preparation, planting date, spacing and germination after 7 days • Apply compost to the cereal plot at the recommended rate before planting • Record quantity applied, area covered and application method • Monitor the cereal plot weekly for three weeks • Record plant height, leaf colour, weed pressure and any pest or disease signs	Cereal seeds (maize or sorghum), compost, hoes, measuring tape/tools, crop monitoring table template, drone or drone footage, farm sketch map, college farm plots, smartphones, PPE, etc.

	manure and biological nitrogen fixation through rotation with legumes 2.5 Describe weed, pest and disease management in cereal production in organic system 2.6 Describe maturity indices and harvesting methods for cereals in organic system	• Discuss weed, pest and disease management using organic methods • Explain maturity indices and harvesting for each cereal		on the cereal plot • Record weed species, weed density and time taken • Use drone or drone footage to observe cereal crop coverage and any pest damage patterns across a farm plot from above • Annotate the farm map with observations	• Present findings in a monitoring table • Carry out manual weeding on the cereal plot; • Record weed species, weed density and time taken • Use drone or drone footage to observe cereal crop coverage and any pest damage patterns across a farm plot from above • Annotate the farm map with observations	
General Objective 3.0: Know legume crop production in organic system						
7-9	3.1 Describe the major legume crops grown in Nigeria: cowpea, groundnut, soybean, bambara nut, etc. 3.2 Explain the agronomic requirements of each legume: climate, soil, season, variety selection, etc. 3.3 Describe land preparation, planting and spacing for	• Explain the major organic legume crops grown in Nigeria: cowpea, groundnut, soybean and bambara nut using photographs and production data • Discuss the agronomic requirements using crop production guides • Discuss land	Legume crop photographs, crop production guides, Rhizobium inoculant, nitrogen fixation diagram, pest and disease management chart, projector, marker board, etc.	• Prepare and plant a cowpea or groundnut plot on the college farm • Inoculate seeds with Rhizobium before planting • Record planting date, spacing and germination after 7 days • Assess nodule formation on legume roots 3 weeks after planting: uproot three plants • Count the nodules observed	Guide students to: • Prepare and plant a cowpea or groundnut plot on the college farm • Inoculate seeds with Rhizobium before planting • Record planting date, spacing and germination after 7 days • Assess nodule formation on legume roots 3 weeks after planting: uproot three	Legume seeds (cowpea or groundnut), Rhizobium inoculant, compost, hoes, crop monitoring table, weighing scale, threshing equipment, moisture meter, college farm plots, field notebooks,

	organic legume production 3.4 Explain the role of biological nitrogen fixation (Rhizobium) in organic legume production and how to use biofertilizer inoculants 3.5 Describe organic management of pests and diseases common to legume crops in Nigeria: pod borers, aphids, cercospora leaf spot, root rot, etc. 3.6 Describe harvesting and threshing of organic legume crops	preparation and planting for organic legumes • Discuss biological nitrogen fixation and describe Rhizobium inoculation • Explain organic pest and disease management for legumes • Explain harvesting and threshing for each legume		• Compare with uninoculated control plants • Monitor the legume plot weekly for three weeks: • Record plant height, leaf colour, pod development stage and any pest or disease signs • Harvest a legume crop from the college farm; • Record crop name, harvest method, quantity harvested and moisture content of the seed • Thresh the harvested legume grain using available equipment • Clean the harvested legume • Record weight before and after threshing and final grain quality	plants • Count the nodules observed • Compare with uninoculated control plants • Monitor the legume plot weekly for three weeks: • Record plant height, leaf colour, pod development stage and any pest or disease signs • Harvest a legume crop from the college farm; • Record crop name, harvest method, quantity harvested and moisture content of the seed • Thresh the harvested legume grain using available equipment • Clean the harvested legume • Record weight before and after threshing and final grain quality	smartphones, PPE, etc.
General Objective 4.0: Understand root and tuber crop production in organic system						
10 - 12	4.1 Describe the major root and tuber crops grown in Nigeria:	• Explain each major root and tuber crop with photographs	Root and tuber crop photographs, crop production	• Prepare a ridged or mounded plot on the college farm.	Guide students to: • Prepare a ridged or mounded plot on the	Cassava or sweet potato cuttings, yam setts, compost,

yam, cassava, sweet potato, cocoyam, Irish potato, etc. 4.2 Explain the agronomic requirements of each root and tuber crop: climate, soil, season and planting material selection 4.3 Describe land preparation, planting methods and spacing for root and tuber crop production in organic system. 4.4 Explain organic soil fertility management for root and tuber crops: compost, green manure, mulching, etc. 4.5 Describe weed, pest and disease management in root and tuber crop production in organic system: cassava mosaic, yam beetles, sweet potato weevil etc. 4.6 Describe maturity	and production data • Discuss agronomic requirements using crop production guides in organic system. • Explain land preparation and planting methods with spacing guides in organic system. • Discuss organic fertility management for root and tuber crops with farm examples • Explain pest and disease management for root and tuber crops in organic system. • Explain maturity indicators and harvesting methods for each crop	guides, spacing guide, organic fertility management chart, pest and disease management chart, projector, marker board, etc.	• Plant cassava, stems, yam or sweet potato cuttings; • Record land preparation method, ridge or mound dimensions, planting date and cutting establishment rate after 2 weeks • Apply mulch between rows of an established root crop plot; • Record mulch material, depth applied and effect on soil moisture compared with an unmulched row after one week • Identify common pests and diseases on root and tuber crops on the college farm or nearby farm • Photograph each of the identified pest and disease • Record crop affected, damage type and one organic management action recommended • Monitor a root crop plot weekly for three weeks: • Record canopy cover, weed pressure and any pest or disease signs in a monitoring table • Harvest yam or cassava	college farm. • Plant cassava, stems, yam or sweet potato cuttings; • Record land preparation method, ridge or mound dimensions, planting date and cutting establishment rate after 2 weeks • Apply mulch between rows of an established root crop plot; • Record mulch material, depth applied and effect on soil moisture compared with an unmulched row after one week • Identify common pests and diseases on root and tuber crops on the college farm or nearby farm • Photograph each of the identified pest and disease • Record crop affected, damage type and one organic management action recommended • Monitor a root crop plot weekly for three weeks	organic mulch materials, hoes, measuring tape, crop monitoring table, weighing scale, pest identification guide, smartphones, college farm plots, field notebooks, PPE, etc.
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	indicators and harvesting methods for organic root and tuber crops			from the college farm Record crop name, harvesting method, quantity harvested, tuber condition and storage method used	- Record canopy cover, weed pressure and any pest or disease signs in a monitoring table - Harvest yam or cassava from the college farm - Record crop name, harvesting method, quantity harvested, tuber condition and storage method used	
General Objective 5.0: Understand harvesting, post-harvest handling and record keeping for organic annual crops						
13-15	5.1 Explain harvest timing and maturity indicators for major organic annual crops 5.2 Explain post-harvest handling requirements for organic annual crops: cleaning, sorting, grading, packaging and labelling 5.3 Explain storage methods for organic annual crops: hermetic bags, metal bins, cribs and cool stores 5.4 Explain the record-keeping requirements	Discuss maturity indicators for each major annual crop type Describe post-harvest handling steps with farm photographs Describe storage methods and demonstrate hermetic bag sealing Describe record-keeping requirements for organic certification of annual crop enterprises	Maturity indicator charts, post-harvest handling photographs, hermetic bag samples, storage method diagrams, organic certification harvest record template, projector, marker board, etc.	- Harvest a cereal, legume, root and tuber crop from the college farm at correct maturity; - Record crop name, maturity indicator observed, date and quantity harvested - Sorting and grading of the harvested crop into quality grades - Record grading criteria and percentage in each grade - Package and label a batch of graded organic annual crop produce; include crop name, weight, harvest date, farm name and organic claim on the label - Store a grain sample in	Guide students to: - Harvest a cereal, legume, root and tuber crop from the college farm at correct maturity - Record crop name, maturity indicator observed, date and quantity harvested - Sorting and grading the harvested crop into quality grades - Record grading criteria and percentage in each grade - Package and label a batch of graded organic annual crop produce; include crop name, weight, harvest date,	College farm crops ready for harvest, harvesting tools, grading bins, packaging materials, label template, open sack, hermetic bags, metal bin, moisture meter, harvest record template, field notebooks, etc.

	for organic annual crop production in certified organic systems			three containers: open sack, hermetic bag and metal bin; • Compare grain condition and pest presence after 2 weeks • Complete a harvest and production record for the crop harvested during this session • Fill all required fields for organic certification	farm name and organic claim on the label • Store a grain sample in three containers: open sack, hermetic bag and metal bin; • Compare grain condition and pest presence after 2 weeks • Complete a harvest and production record for the crop harvested during this session • Fill all required fields for organic certification	
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ORGANIC FARM MANAGEMENT AND DIGITAL RECORD KEEPING**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC FARM MANAGEMENT AND DIGITAL RECORD KEEPING	COURSE CODE: OAT 222	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 the knowledge and practical skills to plan, organise, supervise and document organic farm operations using digital tools.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand organic farm planning and organisation
- 2.0 Know farm budgeting and financial management on an organic farm;
- 3.0 Understand farm supervision and labour management on an organic farm;
- 4.0 Know digital tools for farm record keeping and management;
- 5.0 Know how to prepare and manage organic certification documentation;
- 6.0 Understand farm monitoring and evaluation practices using digital tools.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC FARM MANAGEMENT AND DIGITAL RECORD KEEPING	COURSE CODE: OAT 222	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 the knowledge and practical skills to plan, organise, supervise and document organic farm operations using digital tools.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand organic farm planning and organisation

1 – 2	1.1 Explain the importance of farm planning in organic agriculture 1.2 Describe the components of an organic farm planing: land use map, crop calendar, input plan, labour schedule, financial plan etc. 1.3 Explain how to prepare a seasonal farm plan for an organic farm 1.4 Describe how to organise farm activities into a weekly and monthly	• Discuss farm planning importance with evidences from Nigerian organic farms • Describe each component using a sample plan document • Describe seasonal farm plan preparation using a template • Explain weekly work schedule organisation with a farm calendar	Sample organic farm plan, seasonal farm plan template, weekly farm calendar template, certification compliance guide, projector, video, marker board, etc.	• Prepare a seasonal farm plan for the college farm: include land use map, crop calendar, input requirements and labour schedule for one season • Prepare a weekly work schedule for the college farm: record activity, responsible person, time and resources needed for one week • Review a sample organic farm plan • Identify two strengths and two improvement areas; present findings	Guide students to: • Prepare a seasonal farm plan for the college farm: include land use map, crop calendar, input requirements and labour schedule for one season • Prepare a weekly work schedule for the college farm: record activity, responsible person, time and resources needed for one week • Review a sample organic farm plan • Identify two strengths and two improvement	Seasonal farm plan template, weekly work schedule template, sample organic farm plan, farm sketch map template, measuring tape, field notebooks, smartphones, etc.
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	work schedule 1.5 Explain how farm planning supports organic standards, compliance and certification	example • Discuss farm planning and certification compliance		to the class • Map the college farm land use: label each plot with current crop, area and planned next crop	areas; present findings to the class • Map the college farm land use: label each plot with current crop, area and planned next crop	
General Objective 2.0: Know farm budgeting and financial management on an organic farm						
3 – 5	2.1 Explain the importance of farm budgeting in organic farming 2.2 Describe the components of a farm budget: gross income, variable costs, fixed costs and net income 2.3 Explain how to calculate gross margin for an organic crop or livestock enterprise 2.4 Describe break-even analysis for an organic farm enterprise 2.5 Explain basic farm financial record keeping: cash income, cash expenditure, profit-and-loss account,	• Discuss farm budgeting importance with Nigerian examples • Explain budget components using a sample farm budget • Describe gross margin calculation for a specific Nigerian organic crop • Explain break-even analysis with a worked example • Describe financial record keeping and walk through sample cash records	Sample organic farm budget, gross margin template, break-even analysis example, cash income and expenditure record templates, projector, marker board, video, etc.	• Prepare a gross margin budget for one organic enterprise on the college farm • Record all variable costs, estimated yield, selling price and compute gross margin • Calculate the break-even yield for the same enterprise • Record all college farm income and expenditure for two weeks using cash record templates • Compute the running balance • Prepare a simple profit-and-loss account for the college farm for one month using digital tools to analyse data collected during this course	Guide students to: • Prepare a gross margin budget for one organic enterprise on the college farm • Record all variable costs, estimated yield, selling price and compute gross margin • Calculate the break-even yield for the same enterprise • Record all college farm income and expenditure for two weeks using cash record templates • Compute the running balance • Prepare a simple profit-and-loss account for the college farm for one month using digital tools to analyse data collected during this course	Gross margin budget template, break-even calculation worksheet, cash income and expenditure record templates, profit-and-loss template, field notebooks, smartphones, etc.

	etc.					
General Objective 3.0: Understand farm supervision and labour management on an organic farm						
6 – 7	3.1 Explain the role of the organic farm supervisor: planning, organising, delegating, directing, controlling and monitoring farm workers 3.2 Describe how to delegate tasks to farm workers and follow up on task completion 3.3 Explain occupational health and safety (OHS) on organic farms: PPE use, tool safety and safe handling of farm inputs 3.4 Describe farm worker motivation and simple performance evaluation 3.5 Explain the basic legal requirements for farm labour in Nigeria 3.6 Explain the concept of remote monitoring and management of organic enterprise	• Explain the role of supervisors with Nigerian organic farm examples • Describe task delegation and follow-up procedures • Explain OHS requirements with PPE demonstration • Describe worker motivation techniques and simple performance evaluation • Explain Nigerian farm labour legal requirements briefly • Discuss the concept of remote monitoring and management of organic enterprise	Describe the role of Farm supervisor <i>role description</i> , task delegation form, OHS guide, PPE display, worker performance evaluation form, Nigerian minimum wage guide, projector, marker board, video, etc.	• Lead a college farm work session as supervisor: assign tasks to four students, monitor work quality, correct errors and record task completion at end of session • Complete a worker performance evaluation form for two students after one farm session • Record task, quality of work, time management and overall rating • Carry out an OHS inspection of the college farm • Record five potential hazards, rate each by severity and recommend one corrective action for each • Prepare a one-week labour schedule for the college farm: assign specific tasks to named workers for each	Guide students to: • Lead a college farm work session as supervisor: assign tasks to four students, monitor work quality, correct errors and record task completion at end of session • Complete a worker performance evaluation form for two students after one farm session • Record task, quality of work, time management and overall rating • Carry out an OHS inspection of the college farm • Record five potential hazards, rate each by severity and recommend one corrective action for each • Prepare a one-week labour schedule for the college farm: assign specific tasks to named	Task assignment form, worker performance evaluation form, OHS inspection checklist, labour schedule template, PPE set, college farm, smartphones, field notebooks, etc.

				working day	workers for each working day	
General Objective 4.0: Know digital tools for farm record keeping and management						
8 – 10	4.1 Explain the benefits of digital record keeping for organic farm management and certification 4.2 Describe digital tools for Nigerian organic farmers: Google Sheets, KoBoToolbox and farm management apps 4.3 Explain how to design a simple digital farm record system covering all required organic certification records 4.4 Describe how to use Google Sheets to create an integrated farm record with linked tabs 4.5 Explain how to back up and share digital farm records securely	• Explain digital record keeping benefits with organic farm certification examples • Describe the profile of each digital tool with a live demonstration on a smartphone • Describe the design of a simple digital farm record system • Describe a Google Sheets integrated farm record with linked tabs • Explain data backup and secure sharing procedures	Smartphones or computers with Google Sheets and KoBoToolbox, sample digital farm record system, projector, marker board, videos, etc.	• Set up a Google Sheets integrated farm record for the college farm • Create linked tabs for soil management, crop activities, pest control, harvest and sales; enter data for two weeks • Design a KoBoToolbox form for recording daily farm activities: include date, activity type, plot, inputs used and quantity; test the form in the field • Enter one month of college farm records into the digital record system; export as PDF and submit • Carry out a digital record audit: check completeness of all tabs • Identify missing entries and fill the gaps	Guide students to: • Set up a Google Sheets integrated farm record for the college farm • Create linked tabs for soil management, crop activities, pest control, harvest and sales; enter data for two weeks • Design a KoBoToolbox form for recording daily farm activities: include date, activity type, plot, inputs used and quantity; test the form in the field • Enter one month of college farm records into the digital record system; export as PDF and submit • Carry out a digital record audit: check completeness of all tabs • Identify missing entries and fill the gaps	Smartphones or computers with Google Sheets and KoBoToolbox, integrated farm record template, PDF export guide, college farm activity data, field notebooks, smartphones, etc.
General Objective 5.0: Know how to Prepare and manage organic certification documentation						

11 – 12	5.1 Explain the review of the documents required for organic certification: farm map, field history, input records, crop production records, fencing, biosafety, harvest records, sales records, etc. 5.2 Explain how to organise certification documents into a farm file ready for inspection 5.3 Describe how to prepare a farm for a certification inspection 5.4 Explain how to respond to a certification inspector: answering questions, providing records and correcting findings 5.5 Describe how to maintain certification compliance between annual inspections	• Discuss the review of all the required certification documents using a document checklist • Explain farm file organisation with a sample well-organised certification folder • Describe pre-inspection preparation steps • Explain how to respond to a certification inspector with a role-play example • Describe ongoing compliance maintenance between inspections	Organic certification documents checklist, sample certification farm file, pre-inspection guide, inspector response guide, projector, marker board, videos, etc.	• Compile a complete certification documentation folder for the college farm: include all records from this course, organised into correct sections; check against the certification checklist • Carry out a mock pre-inspection check on the college farm: assess farm tidiness, input store organisation, record availability and staff readiness • Record findings and prepare an action list • Role-play a certification inspection • Prepare a quarterly farm compliance calendar: list records to update, practices to maintain and checks to conduct in each month of the year	Guide students to: • Compile a complete certification documentation folder for the college farm: include all records from this course, organised into correct sections; check against the certification checklist • Carry out a mock pre-inspection check on the college farm: assess farm tidiness, input store organisation, record availability and staff readiness • Record findings and prepare an action list • Role-play a certification inspection: (one student acts as inspector checking three records and asking five questions) • Debrief the experience • Prepare a quarterly farm compliance calendar: list records to update, practices to maintain and checks to conduct in each month of the year	Certification document checklist, sample certification farm file, pre-inspection checklist, role-play scenario cards, quarterly compliance calendar template, PPE, marphones field notebooks, etc.
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General Objective 6.0: Understand farm monitoring and evaluation practices using digital tools

13 – 15	6.1 Explain farm monitoring and evaluation (M&E) in organic farm management 6.2 Describe simple M&E indicators: crop yield, soil health score, income, input cost and certification compliance 6.3 Explain how to use digital tools to collect, analyse and use M&E data to improve farm performance 6.4 Describe how to prepare a simple farm performance report and present the report digitally	• Explain M&E concept and importance in organic farm management • Describe simple M&E indicators with Nigerian organic farm examples • Explain how to use digital tools for data collection, analysis and using a farm as an example • Explain how to prepare simple farm performance report and present the report digitally	M&E indicator list, M&E data collection form, farm performance report template, projector, marker board, etc.	• Design a simple M&E plan for the college farm using a digital tool: select five indicators, specify how each will be measured, who is responsible and how often • Collect M&E data from the college farm at two points during this semester • Record all five indicators at each point • Compare changes digitally • Analyse M&E data • Identify which indicators improved or declined and explain possible reasons • Prepare digital farm performance report: summarise M&E findings, highlight three achievements and recommend two specific improvements • Use Zoom, Google meet, etc to digitally and remotely present the farm performance	Guide students to: • Design a simple M&E plan for the college farm using a digital tool: select five indicators, specify how each will be measured, who is responsible and how often • Collect M&E data from the college farm at two points during this semester • Record all five indicators at each point • Compare changes digitally • Analyse M&E data • Identify which indicators improved or declined and explain possible reasons • Prepare digital farm performance report: summarise M&E findings, highlight three achievements and recommend two specific improvements • Use Zoom, Google meet, etc to digitally	M&E plan template, M&E data collection form, farm performance report template, college farm M&E data, projector for presentations, field notebooks, etc.
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				report to the class.	and remotely present the farm performance report to the class.	
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COURSE ASSESSMENT:

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



DIGITAL MARKETING AND AGRIBUSINESS FOR ORGANIC PRODUCTS**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: DIGITAL MARKETING AND AGRIBUSINESS FOR ORGANIC PRODUCTS	COURSE CODE: OAT 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 the knowledge and practical skills to market organic agricultural products using digital tools and develop basic agribusiness skills for the Nigerian organic sector.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the organic agricultural markets in Nigeria;
- 2.0 Know digital marketing tools for organic products;
- 3.0 Know how to develop and manage a social media platforms for organic products;
- 4.0 Understand social media marketing for organic agricultural products;
- 5.0 Understand basic agribusiness principles for organic enterprises;
- 6.0 Know how to develop a simple organic agribusiness plan;
- 7.0 Understand how to apply customer service and quality assurance in organic agribusiness.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: DIGITAL MARKETING AND AGRIBUSINESS FOR ORGANIC PRODUCTS	COURSE CODE: OAT 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 the knowledge and practical skills to organic agricultural products using digital tools and develop basic agribusiness skills for the Nigerian organic sector.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the organic agricultural markets in Nigeria

1 – 2	1.1 Describe the current organic agricultural markets in Nigeria: size, growth, key buyers, market gaps, etc. 1.2 Explain the market channels for organic products: direct farm sales, whole sellers, local markets, supermarkets, health food stores, online platforms, etc. 1.3 Describe the types of buyers: individual consumers, whole sellers, processors, exporters, institutional buyers, etc. 1.4 Explain the importance of	• Discuss the Nigerian organic market using available markets data • Explain each market channel with Nigerian organic product and its examples • Describe buyer types and their specific requirements • Explain certification importance for premium market access • Discuss organic	Nigerian organic market data, market channel diagram, buyer type profile cards, organic label samples, projector, videos, marker board, etc.	• Visit a supermarket, health food store or organic market; • Record organic products available, certifying body, price and packaging • Compare with conventional equivalents • Interview five potential buyers of organic products • Record what they buy, price they pay and quality they expect • Present findings to the	Guide students to: • Visit a supermarket, health food store or organic market; • Record organic products available, certifying body, price and packaging • Compare with conventional equivalents • Interview five potential buyers of organic products • Record what they buy, price they pay and quality they	Nearby supermarket or organic market, observation recording form, buyer survey template, market opportunity brief template, field notebooks, smartphones, transport, etc.
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	organic certification and labelling for accessing premium markets 1.5 Describe market trends for organic products in Nigeria	market trends with recent examples		class - Identify two gaps in the local organic market the college farm could fill - Prepare a market opportunity.	expect - Present findings to the class - Identify two gaps in the local organic market the college farm could fill - Prepare a market opportunity.	
General Objective 2.0: Know digital marketing tools for organic products						
3 – 4	2.1 Define digital marketing. 2.2 Explain its importance to organic farmers in Nigeria 2.3 Explain the main digital marketing tools 2.4 Explain how to take good product photographs for digital marketing using a smartphone 2.5 Describe how to write a simple product description: name, key benefits, certification status, weight, price, contact, etc. 2.6 Explain online payment and delivery options available to Nigerian organic products sellers	- Explain digital marketing and its importance to organic farmers in Nigeria - Describe the main digital marketing tools: WhatsApp Business, Facebook, Instagram, online marketplaces, farm websites, etc. - Describe how to take good product photographs for digital marketing using a smartphone - Describe how to write a simple product description: name, key	Smartphones, digital marketing tool profiles, product photography guide, product description template, online payment options guide, projector, videos, marker board, etc.	- Photograph three organic products from the college farm - Use good lighting, clean background and close-up angle - Select the best photo of each and record what made it effective - Consider a product description for each of the three products: name, benefit, certification status, weight, price and contact - Compare the marketing of two organic sellers found online - Record platform, product presentation,	Guide students to: - Photograph three organic products from the college farm - Use good lighting, clean background and close-up angle - Select the best photo of each and record what made it effective - Consider a product description for each of the three products: name, benefit, certification status, weight, price and contact - Compare the marketing of two organic sellers found	Smartphones, college farm organic products, product description template, internet access, online marketplace research guide, field notebooks, etc.

		benefits, certification status, weight, price, contact, etc. Describe online payment and delivery options available to Nigerian organic products sellers		pricing and buyer engagement - Research two online marketplaces where Nigerian organic farmers sell products - Record platform name, registration process, fees and product types	online - Record platform, product presentation, pricing and buyer engagement - Research two online marketplaces where Nigerian organic farmers sell products - Record platform name, registration process, fees and product types	
General Objective 3.0: Know how to develop and manage a social media platforms for organic products						
5 – 7	3.1 Explain any of the social media features: catalogue, labels, quick replies, business profile, etc. 3.2 Describe how to set up any of the social media profile for an organic farm 3.3 Explain how to build and maintain a any of the social media customers contact list 3.4 Describe how to use the any of the social media catalogue to display and update products	- Explain any of the social media features with a live demonstration - Describe any of the social media profile setup step by step - Explain how to build and maintain customers contact list. - Describe catalogue setup and product update procedure - Discuss professional buyer communication with example messages	Smartphones with WhatsApp Business, setup guide, catalogue template, professional communication guide, projector, videos, marker board, etc.	- Set up any of the social media profile for the college farm: farm name, description, address, opening hours, profile photo, etc. - Build any of the social media catalogue with at least five college farm organic products: name, price, photograph and description for each - Send a professional product availability message to a sample buyer contact: include	Guide students to: - Set up any of the social media profile for the college farm: farm name, description, address, opening hours, profile photo, etc. - Build any of the social media catalogue with at least five college farm organic products: name, price, photograph and description for each - Send a professional	Smartphones, social media apps, college farm organic products, product photographs, catalogue template, buyer enquiry simulation cards, field notebooks, etc.

	3.5 Explain how to communicate professionally with buyers on any of the social media platforms.			product, price, availability and delivery option • Respond to three simulated buyer enquiries on any of the social media professionally • Record the responses given • Update the catalogue by removing one out-of-season product and adding one new seasonal product	product availability message to a sample buyer contact: include product, price, availability and delivery option • Respond to three simulated buyer enquiries on any of the social media professionally • Record the responses given • Update the catalogue by removing one out-of-season product and adding one new seasonal product	
General Objective 4.0: Understand social media marketing for organic agricultural products						
8 – 9	4.1 Explain the use of social media (Facebook, Tik Tok, Instagram, etc) for marketing organic products in Nigeria 4.2 Describe how to create a simple social media platform for an organic farm 4.3 Explain how to create engaging content: product	• Explain social media use in Nigerian organic farm marketing with examples • Describe social media account creation step by step • Discuss content creation with examples of successful Nigerian	Smartphones with Facebook, Tik Tok and Instagram apps, sample organic farm social media pages, content creation guide, hashtag guide, performance tracking guide, projector,	• Create a Facebook page for the college farm: add farm name, profile photo, cover photo, description and contact information • Prepare and post three pieces of organic product content on the social media page: one product announcement, one farm activity photo and one harvest video	Guide students to: • Create a Facebook page for the college farm: add farm name, profile photo, cover photo, description and contact information • Prepare and post three pieces of organic product content on the social	Smartphones with Facebook, Tik Tok, and Instagram apps, college farm organic products, product photographs and videos, hashtag list, performance

	posts, farm photos, harvest videos, customer testimonials, etc. 4.4 Describe how to use free social media tools to reach more buyers: post timing, hashtags and location tagging 4.5 Explain how to track basic social media performance: followers, post reach and buyer enquiries	organic farm posts • Explain free reach tools: timing, hashtags and location tags • Explain basic performance tracking using platform analytics	videos, market board, etc.	or photograph • Create a simple Instagram account for the college farm • Post three product photographs with captions and relevant hashtags • Track the Facebook page performance after one week: • Record followers, post reach and any buyer enquiries • Present findings to the class	media page: one product announcement, one farm activity photo and one harvest video or photograph • Create a simple Instagram account for the college farm • Post three product photographs with captions and relevant hashtags • Track the Facebook page performance after one week: • Record followers, post reach and any buyer enquiries • Present findings to the class	tracking form, projector, etc.
General Objective 5.0: Understand basic agribusiness principles for organic enterprises						
10-11	5.1 Define agribusiness. 5.2 Explain agribusiness importance for organic farmers in Nigeria 5.3 Explain the difference between a subsistence organic farm and an organic agribusiness 5.4 Describe the key principles of a successful	• Define agribusiness and explain its importance to Nigerian organic enterprise examples • Discuss the difference between a subsistence organic farm and an organic agribusiness	Agribusiness vs subsistence farm comparison table, agribusiness principles guide, value addition income comparison chart, CAC and	• Study a case of a successful Nigerian organic agribusiness • Record product, marketing approach, registration status and estimated monthly turnover • Present findings • Calculate the value	Guide students to: • Study a case of a successful Nigerian organic agribusiness • Record product, marketing approach, registration status and estimated monthly turnover • Present findings	Nearby organic agribusiness or online case study, value addition calculation worksheet, opportunity identification

	agribusiness: market focus, cost management, quality, customer service and reinvestment 5.5 Explain value addition in organic agribusiness: transforming raw produce by adding value to increase income 5.6 Describe legal requirements for registering an organic agribusiness: CAC registration, ECOSAT/NOAN and NAFDAC requirements for processed products	• Describe key agribusiness principles with examples in Nigeria • Explain value addition with organic product income comparison examples • Explain CAC and NAFDAC registration requirements briefly	NAFDAC registration guide, projector, videos, marker board, etc.	added by processing one organic product • Compare raw and processed product price per kilogram; • Record the income difference • Identify one value addition opportunity for a college farm product: describe the product, processing step, estimated cost, selling price and target buyer • Research the CAC business registration process for a small organic farm enterprise: • Record steps, documents needed, fees and time required	• Calculate the value added by processing one organic product • Compare raw and processed product price per kilogram; • Record the income difference • Identify one value addition opportunity for a college farm product: describe the product, processing step, estimated cost, selling price and target buyer • Research the CAC business registration process for a small organic farm enterprise: • Record steps, documents needed, fees and time required	template, CAC registration guide, smartphones with internet, field notebooks, transport, etc.
General Objective 6.0: Know how to develop a simple organic agribusiness plan						
12-13	6.1 Define agribusiness plan 6.2 Explain the components of a simple organic agribusiness plan: product, market, production plan, costs,	• Define agribusiness plan and explain agribusiness plan components using a sample Nigerian organic product plan	Sample organic agribusiness plan, agribusiness plan template, six-month projection	• Prepare a simple agribusiness plan for a college farm product: include product, target market, unique selling point, production plan,	Guide students to: • Prepare a simple agribusiness plan for a college farm product: include product, target	Agribusiness plan template, investor summary template, six-month

	income projection and marketing strategy 6.3 Describe how to identify a target market and unique selling point for an organic agribusiness 6.4 Explain how to project income and costs over six months 6.5 Describe how to present a simple agribusiness plan to a potential investor or development programme	• Describe target market identification and unique selling point with examples • Describe a six-month income and cost projection using a template • Discuss how to present a plan clearly to a non-technical audience	template, investor presentation guide, projector, videos, marker board, etc.	six-month projection and marketing strategy • Prepare investor summary: highlight the product, market opportunity, expected profit and support needed • Present the agribusiness plan to the class and allow students to ask questions • Respond to at least three questions from peers and the lecturer • Review a peer student's agribusiness plan using a structured checklist and provide at least two improvement comments	market, unique selling point, production plan, six-month projection and marketing strategy • Prepare investor summary: highlight the product, market opportunity, expected profit and support needed • Present the agribusiness plan to the class and allow students to ask questions • Respond to at least three questions from peers and the lecturer • Review a peer student's agribusiness plan using a structured checklist and provide at least two improvement comments	projection template, peer review checklist, projector for presentations, field notebooks, smartphones, etc.
General Objective 7.0: Understand how to apply customer service and quality assurance in organic agribusiness						
14-15	7.1 Explain the importance of customer service in	• Discuss customer service importance with organic business	Customer complaint handling guide,	• Role-play three customer service scenarios: a product	Guide students to: • Role-play three customer service	Customer service scenario cards,

	organic agribusiness 7.2 Describe how to handle customer complaints professionally: listen, acknowledge, resolve and follow up 7.3 Explain quality assurance in organic product sales: consistent grading, correct labelling and product traceability 7.4 Describe how to build customer loyalty: consistent quality, reliable delivery and communication 7.5 Explain how to use customer feedback to improve an organic agribusiness	examples • Describe complaint handling using a four-step procedure • Explain quality assurance requirements for organic products • Describe customer loyalty building with Nigerian organic examples • Explain how to collect and use customer feedback	quality assurance checklist, customer loyalty guide, customer feedback form template, projector, marker board, etc.	complaint, a delivery delay and a quality query • Respond professionally in each; debrief and record what worked and what to improve • Carry out a quality check on three organic products prepared for sale: check grading consistency, labelling completeness and packaging integrity • Record findings and correct any errors • Prepare a customer feedback form for one college farm organic product: include questions on quality, packaging, price, delivery and satisfaction • Collect feedback from five customers or classmates; analyse responses and prepare a one-paragraph improvement recommendation	scenarios: a product complaint, a delivery delay and a quality query • Respond professionally in each; debrief and record what worked and what to improve • Carry out a quality check on three organic products prepared for sale: check grading consistency, labelling completeness and packaging integrity • Record findings and correct any errors • Prepare a customer feedback form for one college farm organic product: include questions on quality, packaging, price, delivery and satisfaction • Collect feedback from five customers or classmates; analyse responses and prepare a one-	quality assurance checklist, organic products for quality check, customer feedback form template, field notebooks, smartphones, projector, etc.
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					paragraph improvement recommendation	
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COURSE ASSESSMENT:

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



ORGANIC VALUE CHAIN DEVELOPMENT AND PROCESSING**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ORGANIC VALUE CHAIN DEVELOPMENT AND PROCESSING	COURSE CODE: OAT 224	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 the knowledge and practical skills to understand organic agricultural value chains and carry out primary processing to add value to organic produce.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the concept of organic agricultural value chains;
- 2.0 Know how to identify and map organic value chain actors and their roles;
- 3.0 Know primary processing to add value to organic produce;
- 4.0 Understand primary processing to add value to organic livestock products;
- 5.0 Understand quality standards in the organic value chain;
- 6.0 Know packaging, labelling and branding for organic value-added products;
- 7.0 Understand market linkage and value chain development for organic enterprises.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY

COURSE TITLE: ORGANIC VALUE CHAIN DEVELOPMENT AND PROCESSING	COURSE CODE: OAT 224	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 the knowledge and practical skills to understand organic agricultural value chains and carry out primary processing to add value to organic produce.

	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources

General Objective 1.0: Understand the concept of organic agricultural value chains

1 – 2	1.1 Define value chain 1.2 Explain value chain importance in organic agriculture 1.3 Describe the stages of the organic value chain: input supply, production, aggregation, processing, packaging, certification, marketing, retail, etc 1.4 Explain the concept of value addition at each stage of value chain 1.5 Describe the challenges facing organic value chains	- Define value chain and explain importance with Nigerian organic product examples - Describe each stage with a Nigerian organic product flow diagram - Explain value addition at each stage with income comparison data - Discuss challenges facing organic value chains in Nigeria - Explain how certification adds value throughout the chain	Nigerian organic value chain flow diagram, value addition income data, organic value chain challenges report, video, projector, marker board, etc.	- Map the complete value chain for one Nigerian organic product - Draw all actors from input supplier to consumer - Record value added and price at each stage - Visit one actor in the organic value chain: a processor, aggregator or retailer - Record their role, inputs received, value added and outputs delivered - Identify three weaknesses in the college farm organic	Guide students to: - Map the complete value chain for one Nigerian organic product - Draw all actors from input supplier to consumer - Record value added and price at each stage - Visit one actor in the organic value chain: a processor, aggregator or retailer - Record their role, inputs received, value added and outputs delivered	Value chain mapping template, nearby value chain actor, observation form, weakness identification template, field notebooks, transport, smartphones, PPE, etc.
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	in Nigeria: limited processing, poor market linkage, etc 1.6 Explain how organic certification adds value at every stage of the chain			value chain and propose one practical solution for each	Identify three weaknesses in the college farm organic value chain and propose one practical solution for each	
General Objective 2.0: Know how to identify and map organic value chain actors and their roles						
3 – 4	2.1 Explain the actors in the organic value chain: input suppliers, farmers, collectors, processors, certification bodies, marketers and consumers 2.2 Explain the role of each actor 2.3 Describe value chain coordination: contracts, standards, price agreements and information sharing 2.4 Explain gender roles in the organic value chain: women as processors, marketers, men as farm workers, etc 2.5 Describe how to build relationships with value chain actors to improve market access	- Discuss all value chain actors with a labelled actor map - Explain the role and incentives of each actor with Nigerian examples - Describe value chain coordination with Nigerian case examples - Discuss gender roles with Nigerian value chain data - Explain relationship building for market access	Organic value chain actor map, actor role descriptions, coordination examples, gender and value chain data, projector, marker board, etc.	- Prepare a value chain actor directory for one Nigerian organic product - Record actor name, role, location and contact - Conduct a value chain actor interview - Record their role, challenges, income and needs from other actors; - Present a one-page summary - Develop a relationship-building plan for the college farm - Identify three key value chain actors to connect with, state the benefits and propose a first contact strategy for each	Guide students to: - Prepare a value chain actor directory for one Nigerian organic product - Record actor name, role, location and contact - Conduct a value chain actor interview - Record their role, challenges, income and needs from other actors; - Present a one-page summary - Develop a relationship-building plan for the college farm - Identify three key value chain actors to connect with, state the benefits and propose a	Value chain actor directory template, value chain actor contact, interview guide, relationship-building plan template, field notebooks, transport, smartphones, etc.

					first contact strategy for each	
General Objective 3.0: Know primary processing to add value to organic produce						
5 – 7	3.1 Define primary processing 3.2 Explain primary processing role in adding value to organic crops 3.3 Describe primary processing operations for major Nigerian organic crops: drying, milling, oil extraction and grinding 3.4 Explain how to maintain organic integrity during processing 3.5 Describe equipment needed for small-scale organic crop processing 3.6 Explain how to calculate the value added by primary processing for a given crop	• Define primary processing and explain value addition with income examples • Describe each processing operation with step-by-step photographs • Explain organic integrity maintenance during processing • Describe processing equipment for small-scale use • Discuss value addition calculation using a specific Nigerian crop example	Processing operation photographs, processing equipment display, organic integrity guide, value addition calculation template, projector, marker board, etc.	• Sun/air dry one organic crop • Record fresh weight, drying time, dry weight and percentage moisture loss; compare market price of fresh and dried • Grind or mill a dried organic product using a manual grinder • Record quantity, processing time and quality of final product • Extract oil from organically grown groundnuts or sesame using a manual press • Record input quantity, oil yield and residual cake weight • Carry out package and label one processed organic product: • Record weight, name, ingredients, farm name, date and organic claim • Calculate value added by processing: compare raw and processed price	Guide students to: • Sun/air dry one organic crop • Record fresh weight, drying time, dry weight and percentage moisture loss; compare market price of fresh and dried • Grind or mill a dried organic product using a manual grinder • Record quantity, processing time and quality of final product • Extract oil from organically grown groundnuts or sesame using a manual press • Record input quantity, oil yield and residual cake weight • Carry out package and label one processed organic product: • Record weight, name, ingredients, farm name, date and organic claim	Organic crop samples, drying trays, weighing scale, manual grinder, manual oil press, packaging materials, label template, value addition calculation worksheet, field notebooks, smartphones, etc.

				per kilogram; • Record income difference and profit margin	• Calculate value added by processing: compare raw and processed price per kilogram; • Record income difference and profit margin	
General Objective 4.0: Understand primary processing to add value to organic livestock products						
8 – 9	4.1 Describe primary processing of organic milk: filtering, packaging and simple yoghurt making 4.2 Describe primary processing of organic eggs: cleaning, grading, packaging and labelling 4.3 Describe primary processing of organic honey: filtering, moisture testing, packaging and labelling 4.4 Explain primary processing of organic meat: humane slaughter, chilling, cutting and packaging 4.5 Explain hygiene and organic integrity requirements during	• Describe milk processing with step-by-step procedure and equipment • Describe egg processing with grading criteria and packaging guide • Describe honey processing with moisture testing and packaging guide • Explain organic meat processing with humane slaughter and chilling requirements • Explain hygiene and organic integrity requirements during processing	Milk processing guide, egg grading chart, honey processing guide, meat processing procedure, hygiene checklist, projector, marker board, video, etc.	• Pack eggs from the college farm layer unit: (grade egg by size and shell quality) • Record date, farm name, grade and organic claim • Filter honey from the college farm beekeeping unit • Test moisture content using a refractometer • Fill jars with the filtered honey • Record moisture result and comparison with the organic standard • Process a milk sample by filtering and packaging: • Record volume processed, packaging method and hygiene	Guide students to: • Pack eggs from the college farm layer unit (grade egg by size and shell quality) • Record date, farm name, grade and organic claim • Filter honey from the college farm beekeeping unit • Test moisture content using a refractometer • Fill jars with the filtered honey • Record moisture result and comparison with the organic standard • Process a milk sample by filtering and packaging: • Record volume	College farm eggs, honey, milk, egg grading chart, honey jars, refractometer, packaging materials, label template, hygiene inspection checklist, field notebooks, video, smartphones, PPE, etc.

	livestock product processing			steps followed • Carry out a hygiene inspection of the college farm processing area: check cleanliness, pest exclusion, water supply and worker hygiene • Recommend two improvements	processed, packaging method and hygiene steps followed • Carry out a hygiene inspection of the college farm processing area: check cleanliness, pest exclusion, water supply and worker hygiene • Recommend two improvements	
General Objective 5.0: Understand quality standards in the organic value chain						
10 – 11	5.1 Explain why quality standards are important in organic value chains 5.2 Describe the quality standards applied to major Nigerian organic products: moisture content, grade size and absence of mould 5.3 Explain how to carry out simple quality testing on organic products before sale 5.4 Describe how non-compliance causes market rejection and	• Explain quality standards importance with Nigerian export rejection examples • Describe quality standards for major products using a standards guide • Discuss simple quality testing methods • Describe consequences of quality failure with documented examples • Explain quality check documentation requirements	Nigerian organic agricultural standard, simple quality testing guide, rejection case examples, quality check record template, projector, marker board, etc.	• Carry out a quality check on three organic products • Test moisture content, check colour, smell and absence of mould • Classify each as acceptable or rejected • Prepare and apply a quality grading scale for one organic product: define three grades; grade a sample batch and record percentage in each grade • Complete a quality check record for two weeks of college farm	Guide students to: • Carry out a quality check on three organic products • Test moisture content, check colour, smell and absence of mould • Classify each as acceptable or rejected • Prepare and apply a quality grading scale for one organic product: define three grades; grade a sample batch and record percentage in each grade • Complete a quality	Organic products for quality check, moisture meter, quality grading scale template, quality check record template, internet access, field notebooks, smartphones, PPE, etc.

	income loss 5.5 Explain how to document quality checks for organic certification and buyer requirements			product preparation • Fill all required fields for each lot • Research quality rejection reasons for one Nigerian organic export crop • Prepare a one-page brief on common problems and how to avoid them	check record for two weeks of college farm product preparation • Fill all required fields for each lot • Research quality rejection reasons for one Nigerian organic export crop • Prepare a one-page brief on common problems and how to avoid them	
General Objective 6.0: Know packaging, labelling and branding for organic value-added products						
12 – 13	6.1 Explain the importance of packaging, labelling and branding in organic value chain development 6.2 Describe packaging types suitable for organic products: paper, natural fibre, glass and approved plastic 6.3 Explain organic labelling requirements: product name, ingredients, net weight, farm name, certifying body, date	• Explain packaging, labelling and branding importance with Nigerian examples • Describe packaging types with samples and suitability discussion • Explain labelling requirements using sample Nigerian and international organic labels • Describe basic branding with examples of successful Nigerian organic brands • Explain market access and price premium	Packaging type samples, organic label samples, labelling requirements guide, organic brand examples, projector, marker board, video, etc.	• Design a label for one college farm organic product: include all required information • Sketch the label and present to the class for feedback • Package three organic products using three different packaging types • Record material, suitability, estimated cost per unit and ease of use for each • Develop a simple brand identity for a college farm organic product	Guide students to: • Design a label for one college farm organic product: include all required information • Sketch the label and present to the class for feedback • Package three organic products using three different packaging types • Record material, suitability, estimated cost per unit and ease of use for each • Develop a simple brand identity for a	Label design template, three packaging material types, organic brand identity template, local market or internet access, scoring table template, field notebooks, transport, smartphones, PPE, etc.

	and organic claim 6.4 Describe basic branding for an organic farm product: product name, logo and unique selling message 6.5 Explain how good packaging and branding improve market access and price premium	benefits		• Create a product name • Write a one-sentence unique selling message and sketch a simple logo • Compare the packaging and labelling of five organic products from a local market or online • Score each on information completeness, packaging quality and brand appeal	college farm organic product • Create a product name • Write a one-sentence unique selling message and sketch a simple logo • Compare the packaging and labelling of five organic products from a local market or online • Score each on information completeness, packaging quality and brand appeal	
General Objective 7.0: Understand market linkage and value chain development for organic enterprises						
14 – 15	7.1 Explain market linkage in organic value chains: connecting farmers directly with buyers, processors and exporters 7.2 Describe market linkage approaches in Nigeria: farmer cooperatives, contract farming, aggregation centres and digital	• Explain market linkage with Nigerian organic farmer-buyer connection examples • Describe each linkage approach with Nigerian case studies • Explain the role of extension and networks in value chain development • Explain a sales contract negotiation with a role-	Nigerian organic market linkage case studies, sample organic sales contract, digital platform guide for organic sellers, projector,	• Identify three potential buyers for one college farm organic product • Record buyer name, type, location, product required and expected price • Role-play a sales negotiation between an organic farmer and a buyer • Negotiate price, quantity, delivery and	Guide students to: • Identify three potential buyers for one college farm organic product • Record buyer name, type, location, product required and expected price • Role-play a sales negotiation between an organic farmer and a buyer • Negotiate price,	Buyer identification template, sample organic sales contract, market linkage plan template, role-play negotiation scenario cards, field notebooks, projector, smartphones, PPE, etc.

platforms	play example	marker board, charts, videos, etc.	payment	quantity, delivery and payment
7.3 Explain the role of extension agents and organic networks in value chain development	Explain digital platform use for organic market linkage in Nigeria		- Record agreed terms and present outcome - Review a sample organic sales contract - Identify key terms, highlight clauses that protect or disadvantage the farmer and propose two improvements - Prepare a market linkage plan for one college farm product - Identify target buyer, propose linkage mechanism, specify quality required and estimate income	- Record agreed terms and present outcome - Review a sample organic sales contract - Identify key terms, highlight clauses that protect or disadvantage the farmer and propose two improvements - Prepare a market linkage plan for one college farm product - Identify target buyer, propose linkage mechanism, specify quality required and estimate income
7.4 Describe how to negotiate a simple sales contract between an organic farmer and a buyer				
7.5 Explain how to use digital platforms for organic product market linkage				
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%				

ANIMAL HEALTH AND WELFARE IN ORGANIC AGRICULTURE**PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY**

COURSE TITLE: ANIMAL HEALTH AND WELFARE IN ORGANIC AGRICULTURE	COURSE CODE: OAT 225	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 the knowledge and practical skills to maintain animal health and welfare in organic livestock systems using preventive, ethno-veterinary and organic-compliant treatment approaches.

GENERAL OBJECTIVES: On completion of this course, the students should be able to:

- 1.0 Understand the principles of animal health management in organic systems;
- 2.0 Know preventive health management in organic livestock production;
- 3.0 Understand the management of common diseases of livestock in organic systems;
- 4.0 Understand ethno-veterinary medicine in organic livestock health management;
- 5.0 Know organic treatment approaches for sick animals;
- 6.0 Understand the Five Freedoms of animal welfare in organic livestock management;
- 7.0 Understand biosecurity measures on organic livestock farms;
- 8.0 Know the health and welfare records for organic livestock certification.

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ANIMAL HEALTH AND WELFARE IN ORGANIC AGRICULTURE			COURSE CODE: OAT 225		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 the knowledge and practical skills to maintain animal health and welfare in organic livestock systems using preventive, ethno-veterinary and organic-compliant treatment approaches.						
	THEORETICAL CONTENT			PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
General Objective 1.0: Understand the principles of animal health management in organic systems						
1	1.1 Explain the health management philosophy in organic livestock: prevention first, natural treatments preferred and minimal use of conventional medicine 1.2 Describe allowed and prohibited treatments in certified organic livestock production 1.3 Explain the	• Discuss organic health management philosophy using the Nigerian Organic Agriculture Standard • Discuss allowed and prohibited treatments using a classification table • Discuss the withdrawal period requirement with livestock examples • Discuss the technician role in animal health management like	Nigerian Organic Agriculture Standard, treatment classification table, withdrawal period guide, health record template, projector, videos, marker board, etc.	• Consider the animal health section of the Nigerian Organic Agriculture Standard • Identify the five most important requirements and explain each • Classify ten common veterinary products as allowed, prohibited or allowed with conditions in certified organic systems; justify each classification • Role-play an early disease detection	Guide students to: • Consider the animal health section of the Nigerian Organic Agriculture Standard • Identify the five most important requirements and explain each • Classify ten common veterinary products as allowed, prohibited or allowed with conditions in certified organic systems; justify each classification • Role-play an early	Nigerian Organic Agriculture Standard, veterinary product list, treatment classification table, role-play scenario cards, health observation form, smartphones, field notebooks, PPE, etc.

	withdrawal period requirement when conventional medicines must be used 1.4 Describe the role of the farm technician in animal health: daily observation, early detection, reporting, etc. 1.5 Explain the importance of animal health records in organic certification	daily observation, early detection and reporting • Explain health record importance for organic certification		scenario: • Identify the signs, decide whether to treat or report and document the action taken	disease detection scenario: • Identify the signs, decide whether to treat or report and document the action taken	
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General Objective 2.0: Know preventive health management in organic livestock production

2 – 3	1.1 Explain the role of good nutrition in preventing disease in organic livestock 1.2 Describe how clean housing and sanitation prevent disease in organic livestock systems 1.3 Explain the role of rotational grazing in parasite control for ruminants 1.4 Describe vaccination	• Discuss the role of good nutrition in preventing disease in organic livestock nutrition and disease prevention relating it with farm examples • Discuss how clean housing and sanitation play a role in disease prevention with the aid of photographs • Explain Explain the role of rotational	Nutrition and disease prevention diagram, housing sanitation guide, rotational grazing and parasite control diagram, vaccination schedule guide, stress reduction handling guide, projector, marker board, etc.	• Review the feed ration for each livestock species on the college farm • Identify nutritional gaps and recommend an organic supplement to address each gap • Clean one livestock housing unit using an approved organic disinfectant • Record the cleaning procedure, materials	Guide students to: • Review the feed ration for each livestock species on the college farm • Identify nutritional gaps and recommend an organic supplement to address each gap • Clean one livestock housing unit using an approved organic disinfectant • Record the cleaning	Feed ration records, organic disinfectant, cleaning equipment, vaccination calendar template, livestock handling guide, college farm livestock, field notebooks, smartphones, PPE, etc.
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	programmes for major livestock species in Nigeria 1.5 Explain stress reduction as a disease prevention strategy: handling, transport and housing management	grazing in parasite control for ruminants linking it with a diagram - Describe vaccination programmes for each major livestock species - Discuss stress reduction strategies as a disease prevention strategy using handling, transport and housing management as examples		used and time taken - Prepare a twelve-month vaccination calendar for the college farm livestock: specify vaccine name, species, route of administration and recommended date - Carryout correct livestock handling technique for one species on the college farm - Record method used and any stress signs observed	procedure, materials used and time taken - Prepare a twelve-month vaccination calendar for the college farm livestock: specify vaccine name, species, route of administration and recommended date - Carryout correct livestock handling technique for one species on the college farm - Record method used and any stress signs observed	
General Objective 3.0: Understand the management of common diseases of livestock in organic systems						
4 – 6	3.1 Describe common diseases of cattle and their organic management: East Coast fever, brucellosis, foot-and-mouth disease and internal parasites 3.2 Describe common diseases of sheep and goats and their organic management: PPR, foot rot, internal	- Explain common diseases of cattle and their organic management: East Coast fever, brucellosis, foot-and-mouth disease and internal parasites - Explain common sheep and goat and their organic management: East Coast fever, brucellosis, foot-and-mouth disease and	Livestock disease clinical sign photographs, organic disease management chart, healthy vs sick animal comparison chart by species, projector, marker board, video clips, etc.	- Carry out a health observation on each livestock species on the college farm - Record behaviour, appetite, body condition, eyes, coat or feathers, droppings and mobility; classify each animal as healthy or requiring attention - Assess FAMACHA score, bottle jaw and body condition in	Guide students to: - Carry out a health observation on each livestock species on the college farm - Record behaviour, appetite, body condition, eyes, coat or feathers, droppings and mobility; classify each animal as healthy or requiring attention - Assess FAMACHA score, bottle jaw and	College farm livestock, health observation form, FAMACHA colour chart, poultry health observation form, disease reference card template, field notebooks, transport, smartphones, PPE, etc.

	parasites and pneumonia 3.3 Describe common diseases of poultry and their organic management: Newcastle disease, Gumboro, coccidiosis and fowl cholera 3.4 Describe common diseases of pigs and their organic management 3.5 Explain the signs of a healthy versus a sick animal for each major livestock species	internal parasites with photographs and management options • Explain common diseases of poultry and their organic management: Newcastle disease, Gumboro, coccidiosis and fowl cholera • Explain common pig diseases with photographs and management options • Discuss the signs of a healthy versus a sick animal for each major livestock species		ruminants • Record findings and recommend whether treatment is needed • Observe poultry on the college farm for signs of respiratory disease: note breathing, nasal discharge and eye condition • Record findings and recommend action • Prepare a disease identification reference card for one livestock species • Create a poster to describe five common diseases, their main signs and one organic management action for each	body condition in ruminants • Record findings and recommend whether treatment is needed • Observe poultry on the college farm for signs of respiratory disease: note breathing, nasal discharge and eye condition • Record findings and recommend action • Prepare a disease identification reference card for one livestock species • Create a poster to describe five common diseases, their main signs and one organic management action for each	
General Objective 4.0: Understand ethno-veterinary medicine in organic livestock health management						
7 – 9	4.1 Define ethno-veterinary medicine. 4.2 Explain the importance of organic livestock health management. 4.3 Describe the common medicinal	• Define ethno-veterinary medicine and discuss the importance of organic livestock health management in Nigeria • Discuss the common	Medicinal plant photographs, ethno-veterinary plant reference chart, remedy preparation guide, administration	• Collect five medicinal plant specimens from the college farm surroundings or nearby area; • Identify each by local and botanical name; record the plant part	Guide students to: • Collect five medicinal plant specimens from the college farm surroundings or nearby area; • Identify each by local and botanical name; record	Fresh medicinal plant materials: neem leaves, garlic, ginger, moringa, aloe vera, African basil; extraction containers;

	plants used in ethno-veterinary practice in Nigeria: neem (<i>Azadirachta indica</i>), garlic (<i>Allium sativum</i>), ginger (<i>Zingiber officinale</i>), moringa (<i>Moringa oleifera</i>), tithonia, pawpaw leaf, aloe vera, African basil (<i>Ocimum gratissimum</i>), etc. 4.4 Explain the active compounds in each plant and their known therapeutic effects: antimicrobial, antiparasitic, anti-inflammatory, immune-boosting properties, etc. 4.5 Describe how to prepare simple ethno-veterinary remedies: aqueous extracts, decoctions, crushed pastes, powders, etc. from available plant	medicinal plants used in ethno-veterinary practice in Nigeria: neem (<i>Azadirachta indica</i>), garlic (<i>Allium sativum</i>), ginger (<i>Zingiber officinale</i>), moringa (<i>Moringa oleifera</i>), tithonia, pawpaw leaf, aloe vera and African basil (<i>Ocimum gratissimum</i>) • Discuss the active compounds and their therapeutic effects using a medicinal plant reference chart • Discuss preparation of three ethno-veterinary remedies: neem leaf decoction, garlic extract and ginger solution • Describe how to administer ethno-veterinary remedies: oral drench, topical application and mixing with feed or water • Discuss the limitations of ethno-	guide, projector, marker board, fresh plant materials, etc.	used, therapeutic use in livestock and method of preparation • Prepare three ethno-veterinary remedies on the college farm: neem leaf aqueous extract for ectoparasites, garlic solution for internal parasite support and ginger decoction for digestive health; • Record materials, preparation process, concentration and recommended dose for each • Administer one prepared ethno-veterinary remedy to a livestock animal on the college farm under supervision: • Record the animal species, condition being managed, remedy used, dose, route of administration and any observable response after 24 hours • Prepare a medicinal plant album: collect, press or photograph at	the plant part used, therapeutic use in livestock and method of preparation • Prepare three ethno-veterinary remedies on the college farm: neem leaf aqueous extract for ectoparasites, garlic solution for internal parasite support and ginger decoction for digestive health; • Record materials, preparation process, concentration and recommended dose for each • Administer one prepared ethno-veterinary remedy to a livestock animal on the college farm under supervision: • Record the animal species, condition being managed, remedy used, dose, route of administration and any observable response after 24 hours • Prepare a medicinal plant album: collect, press or photograph at least eight	filtration cloth; measuring containers; press or camera for album; farmer survey guide; field notebooks; PPE, smartphones, etc.
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	materials 4.6 Explain how to administer ethno-veterinary remedies: oral drench, topical application and mixing with feed or water 4.7 Explain the limitations of ethno-veterinary medicine: not a substitute for veterinary care in serious illness and the need for evidence-based application	veterinary medicine: not a substitute for veterinary care in serious illness and the need for evidence-based application		least eight plants used in ethno-veterinary practice in Nigeria • Label each with local name, botanical name, plant part used, condition treated and preparation method • Interview three local farmers on the ethno-veterinary plants they use for livestock • Record plant names, conditions treated, preparation methods and their assessment of effectiveness • Present findings to the class	plants used in ethno-veterinary practice in Nigeria • Label each with local name, botanical name, plant part used, condition treated and preparation method • Interview three local farmers on the ethno-veterinary plants they use for livestock • Record plant names, conditions treated, preparation methods and their assessment of effectiveness • Present findings to the class	
General Objective 5.0: Know organic treatment approaches for sick animals						
10- 11	5.1 Explain the organic treatment decision process 5.2 Describe the correct use of conventional veterinary medicines when organic treatments are not sufficient: dosage, withdrawal period recording, mandatory reporting	• Discuss the organic treatment decision process: observe, assess severity, apply organic or ethno-veterinary treatment, monitor response and consult a veterinarian if needed • Explain correct use of conventional medicines and	Organic treatment decision flowchart, conventional medicine withdrawal period table, sick animal isolation procedure, first aid guide for farm animals, projector, video,	• Apply the organic treatment decision process to three case study scenarios provided by the lecturer: for each case decide the appropriate action, justify the decision and document it as a health record entry • Set up a sick animal	Guide students to: • Apply the organic treatment decision process to three case study scenarios provided by the lecturer: for each case decide the appropriate action, justify the decision and document it as a health record entry • Set up a sick animal	Case study scenario cards, organic treatment decision flowchart, organic disinfectant, wound dressing materials, treatment record template, college farm livestock,

	and process of reintroduction into the organic system. 5.3 Explain how to isolate and care for a sick animal in an organic livestock system 5.4 Describe the first aid management of common farm animal emergencies: bloat in ruminants, egg binding in poultry and wounds	withdrawal period recording requirements and process of reintroduction into the organic system. • Describe sick animal isolation and care procedure • Describe first aid management for bloat, egg binding and wounds with demonstrations where possible • Describe the use of first aid management for common farm animal emergencies: bloat in ruminants, egg binding in poultry and wounds	marker board, etc.	isolation area on the college farm • Record location, dimensions, bedding, feed and water access and any treatments being given • Carry out the first aid procedure for a simple wound on a farm animal: clean, disinfect using an allowed organic disinfectant and dress the wound • Record steps followed and materials used • Complete a treatment record for one animal that received any treatment during this course • Fill all required fields for organic certification	isolation area on the college farm • Record location, dimensions, bedding, feed and water access and any treatments being given • Carry out the first aid procedure for a simple wound on a farm animal: clean, disinfect using an allowed organic disinfectant and dress the wound • Record steps followed and materials used • Complete a treatment record for one animal that received any treatment during this course • Fill all required fields for organic certification	isolation area, smartphones, field notebooks, PPE, etc.
General Objective 6.0: Understand the Five Freedoms of animal welfare in organic livestock management						
12	6.1 Describe the Five Freedoms of animal welfare. 6.2 Explain each one in the context of organic livestock	• Explain the Five Freedoms and relate each to specific organic livestock management practices	Five Freedoms chart, Five Freedoms welfare assessment checklist, videos,	• Carry out a Five Freedoms welfare assessment on each livestock species on the college or nearby farm: score each	Guide students to: • Carry out a Five Freedoms welfare assessment on each livestock species on the college or nearby farm:	Five Freedoms welfare assessment checklist, college farm livestock, PPE,

	management 6.3 Explain how each freedom is met in a certified organic livestock system 6.4 Describe how to carry out a welfare assessment in an organic livestock farm using the Five Freedoms 6.5 Explain common welfare problems in Nigerian livestock systems and how organic management addresses them 6.6 Describe welfare record keeping requirements for organic livestock certification	• Discuss how each freedom is met in certified organic systems with farm examples • Discuss welfare assessment using a Five Freedoms checklist • Discuss common welfare problems in Nigerian livestock and organic management solutions • Explain welfare record keeping requirements for certification	Nigerian livestock welfare problem photographs, welfare record template, projector, marker board, etc.	freedom (0–3), record evidence for each score and identify the lowest-scoring freedom for each species • Recommend one practical improvement for each freedom scored below 2: specify what to change, estimated cost and expected benefit • Observe and document one welfare concern on the college farm: photograph the issue • Record the freedom affected and recommend corrective action • Complete a welfare assessment record for the college farm: fill all required fields for certification-ready filing	score each freedom (0–3), record evidence for each score and identify the lowest-scoring freedom for each species • Recommend one practical improvement for each freedom scored below 2: specify what to change, estimated cost and expected benefit • Observe and document one welfare concern on the college farm: photograph the issue • Record the freedom affected and recommend corrective action • Complete a welfare assessment record for the college farm: fill all required fields for certification-ready filing	welfare record template, smartphones for photographs, field notebooks, transport, etc.
General Objective 7.0: Understand biosecurity measures on organic livestock farms						
13	7.1 Define biosecurity. 7.2 Explain of the importance in organic livestock	• Define biosecurity and explain the importance in organic livestock	Biosecurity measure photographs, farm entry protocol guide,	• Carry out a biosecurity inspection of the college farm livestock unit	Guide students to: • Carry out a biosecurity inspection of the college farm livestock unit	Biosecurity inspection checklist, footbath tray, organic

	production 7.3 Describe biosecurity measures for organic livestock farms: 7.4 Explain how to set up and manage a farm entry biosecurity protocol 7.5 Describe zoonotic disease risks on organic livestock farms and how biosecurity reduces them 7.6 Explain the role of biosecurity in reducing antibiotic use and supporting organic certification	production • Give examples of livestock disease outbreak. • Discuss biosecurity measures for organic livestock farms: Cleaning, Disinfection, use of PPE, footbath, visitor control, quarantine, vehicle disinfection and feed hygiene, etc • Describe farm entry biosecurity protocol step by step • Discuss zoonotic risks and biosecurity role in reducing transmission • Discuss biosecurity and antibiotic reduction link in certified organic systems	zoonotic risk chart, biosecurity inspection checklist, projector, videos, marker board, etc.	• Record the presence and condition of each biosecurity measure using a checklist • Identify gaps and recommend corrective actions • Set up a functional footbath at the college farm livestock entry • Record disinfectant used, concentration, tray dimensions and replacement schedule • Prepare a farm visitor biosecurity protocol for the college farm • Specify steps a visitor must follow before entering the livestock area; post the completed protocol at the farm entrance • Carry out correct PPE use when entering the livestock unit • Record each PPE item and its biosecurity function	• Record the presence and condition of each biosecurity measure using a checklist • Identify gaps and recommend corrective actions • Set up a functional footbath at the college farm livestock entry • Record disinfectant used, concentration, tray dimensions and replacement schedule • Prepare a farm visitor biosecurity protocol for the college farm • Specify steps a visitor must follow before entering the livestock area; post the completed protocol at the farm entrance • Carry out correct PPE use when entering the livestock unit • Record each PPE item and its biosecurity function	disinfectant, PPE set, visitor protocol template, college farm livestock unit, field notebooks, smartphones, etc.
General Objective 8.0: Know the health and welfare records for organic livestock certification						
14-15	8.1 Explain the health and welfare records	• Explain the use of the health and	Certification record checklist,	• Complete all required health and welfare	Guide students to: • Complete all required	Health and welfare record

	required for organic livestock certification: treatment record, vaccination record, mortality record, welfare assessment record, etc 8.2 Describe how to complete each required record accurately 8.3 Explain how to organise health and welfare records into a certification-ready farm file 8.4 Describe how to use digital tools (e.g. Google Sheets) to maintain livestock health records 8.5 Explain how to present health and welfare records to a certification inspector	welfare records required for organic livestock certification: treatment record, vaccination record, mortality record and welfare assessment record • Explain how to complete each required record accurately • Describe how to organise health and welfare records into a certification-ready farm file • Describe digital tools (e.g. Google Sheets) digital health record setup on a smartphone • Discuss how to present record to a certification inspector with an inspection simulation	sample completed health and welfare records, certification folder sample, Google Sheets on smartphones, projector, videos, marker board, etc.	records for the college farm livestock for one week: fill treatment, vaccination, mortality and welfare assessment records accurately • Organise completed health and welfare records into a certification-ready folder: arrange by type, label each section and check completeness against the certification checklist • Enter two weeks of college farm health records into Google Sheets: create tabs for treatment, vaccination and welfare assessment; export as PDF and submit • Role-play a certification inspection of health and welfare records: one student acts as inspector checking three records and asking questions • Record gaps identified	health and welfare records for the college farm livestock for one week: fill treatment, vaccination, mortality and welfare assessment records accurately • Organise completed health and welfare records into a certification-ready folder: arrange by type, label each section and check completeness against the certification checklist • Enter two weeks of college farm health records into Google Sheets: create tabs for treatment, vaccination and welfare assessment; export as PDF and submit • Role-play a certification inspection of health and welfare records: one student acts as inspector checking three records and asking questions • Record gaps identified	templates, certification record checklist, certification folder, Google Sheets on smartphones, inspection role-play scenario cards, field notebooks, etc.
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COURSE ASSESSMENT:

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



ORGANIC ENTREPRENEURSHIP AND GREEN AGRIBUSINESS

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ORGANIC ENTREPRENEURSHIP AND GREEN AGRIBUSINESS	COURSE CODE: OAT 226	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 entrepreneurial knowledge and practical skills to establish, manage and grow organic agricultural enterprises that are profitable, environmentally responsible and socially beneficial.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand entrepreneurship in organic agriculture; 2.0 Know how to identify and evaluate organic agribusiness opportunities; 3.0 Understand business planning for an organic agribusiness enterprise; 4.0 Understand financial management practices in organic agribusiness; 5.0 Know green and sustainable agribusiness principles; 6.0 Understand safe working practices and occupational health on the organic farm; 7.0 Know how to develop a career and professional development plan in organic agriculture.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN ORGANIC AGRICULTURAL TECHNOLOGY						
COURSE TITLE: ORGANIC ENTREPRENEURSHIP AND GREEN AGRIBUSINESS		COURSE CODE: OAT 226			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 entrepreneurial knowledge and practical skills to establish, manage and grow organic agricultural enterprises that are profitable, environmentally responsible and socially beneficial.						
GENERAL OBJECTIVE 1.0: Understand entrepreneurship in organic agriculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1 – 2	1.1 Define entrepreneurship 1.2 Explain its importance for organic agriculture graduates in Nigeria 1.3 Describe the characteristics of a successful organic agripreneur: innovation, risk-taking, market focus and environmental responsibility 1.4 Explain the difference between being employed and self-employed in organic agriculture 1.5 Describe the types of enterprises an ND graduate can start: organic farm, input supply, processing, certification	• Explain entrepreneurship and its importance for organic agriculture graduates • Describe characteristics of a successful agripreneur with Nigerian examples • Contrast employment and self-employment in organic agriculture • Describe enterprise types with Nigerian organic agripreneur case studies • Discuss the SWOT analysis using current Nigerian organic sector	Nigerian organic agripreneur case studies, enterprise type cards, employment vs self-employment comparison table, projector, videos, marker board, etc.	• Study the case of a successful Nigerian organic agripreneur • Record enterprise type, products, markets, key success factors and main challenges • Present findings • Assess your own entrepreneurial characteristics using a self-assessment checklist: score yourself on ten traits • Identify three strongest and two weakest • Identify two realistic organic agribusiness opportunities in your	Guide students to: • Study the case of a successful Nigerian organic agripreneur • Record enterprise type, products, markets, key success factors and main challenges • Present findings • Assess your own entrepreneurial characteristics using a self-assessment checklist: score yourself on ten traits • Identify three strongest and two	Nigerian organic agripreneur case study or nearby organic enterprise, entrepreneurial self-assessment checklist, opportunity identification template, field notebooks, smartphones, transport, etc.

	support and extension service 1.6 Explain the Strength, weakness, opportunities and threat analysis (SWOT) for organic agricultural entrepreneurship in Nigeria	data		local area: describe the product or service, potential customers, estimated start-up cost and one challenge to address	weakest Identify two realistic organic agribusiness opportunities in your local area: describe the product or service, potential customers, estimated start-up cost and one challenge to address	
General Objective 2.0: Know how to identify and evaluate organic agribusiness opportunities						
3 – 4	2.1 Explain how to identify an organic agribusiness opportunity: market gap, available resources, personal skills and local demand 2.2 Describe a simple market opportunity assessment: buyers, their needs, competition and price they will pay 2.3 Explain how to evaluate the feasibility of an organic agribusiness idea 2.4 Describe how to select the best opportunity from several options 2.5 Explain how to use digital research tools to assess market opportunities for organic products	• Explain opportunity identification using a four-step process • Describe market opportunity assessment using a simple form • Explain feasibility evaluation using a checklist • Describe opportunity selection using a scoring matrix • Describe digital research for organic product demand on a smartphone	Opportunity identification guide, market assessment form, feasibility checklist, opportunity scoring matrix, smartphones with internet, projector, videos, marker board, etc.	• Carry out a market opportunity assessment for two organic agribusiness ideas: fill the market assessment form for each • Select the more feasible one • Carry out a feasibility check on the selected opportunity: assess land, inputs, skills and market access • Record findings and overall verdict • Use a smartphone to research current demand and competition for the selected product in the nearest market • Record price, competition and buyer	Guide students to: • Carry out a market opportunity assessment for two organic agribusiness ideas: fill the market assessment form for each • Select the more feasible one • Carry out a feasibility check on the selected opportunity: assess land, inputs, skills and market access • Record findings and overall verdict • Use a smartphone to research current demand and competition for the selected product in	Market assessment form, feasibility checklist, opportunity scoring matrix, smartphones, internet, field notebooks, projector for presentations, etc.

				types found • Present the selected opportunity to the class in 3 minutes: explain the product, target buyer, feasibility and reason for selection	the nearest market • Record price, competition and buyer types found • Present the selected opportunity to the class in 3 minutes: explain the product, target buyer, feasibility and reason for selection	
General Objective 3.0: Understand business plan for an organic agribusiness enterprise						
5 – 7	3.1 Explain the components of a simple organic agribusiness plan 3.2 Describe how to write a business plan on organic agribusiness 3.3 Describe how to write a product or service description for an organic agribusiness 3.4 Explain how to develop a marketing plan: target market, pricing, promotion and distribution 3.5 Describe how to write a production plan: inputs, land, labour and equipment needed 3.6 Explain how to project income and costs over six months	• Explain components of an organic agribusiness plan using a sample • Explain how to write a business plan on organic agribusiness • Describe product description writing with an organic product example • Explain marketing plan development with a Nigerian organic example • Describe production plan preparation with input, land and labour examples • Describe six-month income and cost projection using a	Sample organic agribusiness plan, product description template, marketing plan template, production plan template, six-month projection template, projector, marker board, videos. etc.	• Write a product description for your selected organic agribusiness: include name, benefits, target customer, unique selling point and certification status • Develop a marketing plan: specify target market, selling price, promotion method and delivery approach • Prepare a production plan: consider all inputs, quantities, sources, costs and labour required per season • Prepare a six-month income and cost	Guide students to: • Write a product description for your selected organic agribusiness: include name, benefits, target customer, unique selling point and certification status • Develop a marketing plan: specify target market, selling price, promotion method and delivery approach • Prepare a production plan: consider all inputs, quantities, sources,	Product description template, marketing plan template, production plan template, six-month projection template, field notebooks, smartphones, videos, etc.

		worked example		projection: record all expected income and costs every month; compute net income for each month and total for six months	costs and labour required per season • Prepare a six-month income and cost projection: record all expected income and costs every month; compute net income for each month and total for six months	
General Objective 4.0: Understand financial management practices in organic agribusiness						
8 – 9	4.1 Explain basic financial management: income and expenditure records, cash flow and cost control 4.2 Explain how to access finance for an organic agribusiness start-up: savings, cooperative loans, bank loans and development grants 4.3 Describe how to manage debtors and creditors in an organic agribusiness 4.4 Explain how to keep and use a simple cash book or Google Sheets to track income and expenditure	• Explain basic financial management with organic agribusiness examples • Describe bank account opening and management for small agribusinesses • Explain finance access options in Nigerian programme with examples • Describe debtor and creditor management with simple examples • Describe cash book and Google Sheets income and expenditure tracking	Cash book template, Google Sheets income and expenditure template, bank account opening guide, Nigerian agri-SME finance programme list, projector, marker board, videos, etc.	• Prepare a cash book for your organic agribusiness: • Record all income and expenditure for two weeks • Compute the closing balance at end of each week • Enter the same two weeks into Google balance/accounting Sheets • Create a chart showing income vs expenditure; export as PDF and submit • Identify sources of finance for organic agribusiness start-ups in Nigeria:	Guide students to: • Prepare a cash book for your organic agribusiness: • Record all income and expenditure for two weeks • Compute the closing balance at end of each week • Enter the same two weeks into Google balance/accounting Sheets • Create a chart showing income vs expenditure; export as PDF and submit • Identify sources of finance for organic agribusiness start-	Cash book template, Google balance/accounting Sheets on smartphones or computers, Nigerian agri-SME finance programme list, cash flow projection template, field notebooks, etc.

				- Record programme name, funder, maximum amount, eligibility and applications process - Prepare a simple cash flow projection for the first three months: - Record all expected income and expenditure each month - Identify any negative month and plan a corrective action	ups in Nigeria: - Record programme name, funder, maximum amount, eligibility and applications process - Prepare a simple cash flow projection for the first three months: - Record all expected income and expenditure each month - Identify any negative month and plan a corrective action	
General Objective 5.0: Know green and sustainable agribusiness principles						
10-11	5.1 Explain green agribusiness: operating an organic enterprise that is profitable, environmentally responsible and socially beneficial 5.2 Describe environmental sustainability practices: waste reduction, water conservation and biodiversity protection 5.3 Explain social responsibility in organic	- Explain green agribusiness using the Triple Bottom Line framework - Describe environmental sustainability practices with organic agribusiness examples - Explain social responsibility with Nigerian organic enterprise case studies - Describe the Triple	Triple Bottom Line framework diagram, environmental sustainability guide, social responsibility case studies, Triple Bottom Line scoring tool, projector, videos, marker board, etc.	- Assess the college farm against the Triple Bottom Line: score on three environmental, three social and three economic indicators; - Identify the lowest-scoring indicator in each dimension and recommend one improvement - Identify three waste streams on the college	Guide students to: - Assess the college farm against the Triple Bottom Line: score on three environmental, three social and three economic indicators; - Identify the lowest-scoring indicator in each dimension and recommend one	Triple Bottom Line scoring tool, waste stream identification form, environmental and social responsibility policy template, college farm, field notebooks, smartphones, etc.

	agribusiness: fair wages, worker safety and community engagement 5.4 Describe the Triple Bottom Line: measuring profit, environmental impact and social impact together 5.5 Explain how green agribusiness practices improve market access and attract premium buyers	Bottom Line using a simple scoring tool • Explain market access and funding benefits of green agribusiness practices		farm • Record waste type, quantity, current disposal and a more sustainable alternative for each • Prepare a simple environmental and social responsibility policy for your organic agribusiness plan: specify two environmental and two social commitments; explain how each will be implemented	improvement • Identify three waste streams on the college farm • Record waste type, quantity, current disposal and a more sustainable alternative for each • Prepare a simple environmental and social responsibility policy for your organic agribusiness plan: specify two environmental and two social commitments; explain how each will be implemented	
General Objective 6.0: Understand safety working practices and occupational health on the organic farm						
12-13	6.1 Explain the importance of occupational health and safety (OHS) on organic farms 6.2 Describe common occupational hazards: tool injuries, zoonotic disease risk, chemical handling, sun exposure and lifting injuries 6.3 Explain the correct use of PPE for different farm tasks: spraying, land	• Explain OHS importance with examples of farm accidents in Nigeria • Describe common hazards with photographs, videos and risk ratings • Explain correct PPE use for different tasks with demonstration • Describe first aid for	OHS hazard photographs, PPE display, first aid procedure guide, farm safety checklist, first aid kit, projector, marker board, etc.	• Carry out an OHS inspection of the college farm • Identify ten hazards, rate each by severity and recommend one corrective action for each • Demonstrate correct donning and doffing of PPE for a spraying task • Record each PPE item	Guide students to: • Carry out an OHS inspection of the college farm • Identify ten hazards, rate each by severity and recommend one corrective action for each • Demonstrate correct donning and doffing of PPE for a	OHS inspection checklist, PPE set, first aid kit, first aid procedure guide, farm safety improvement plan template, college farm, field notebooks, etc.

	preparation, livestock handling and post-harvest processing 6.4 Describe first aid procedures for common farm accidents: cuts, snake bites, chemical exposure, animal bites, insect bites and heat exhaustion 6.5 Explain how to maintain a safe farm work environment: tool storage, clear pathways and clean processing areas	each common accident type • Explain safety farm environment maintenance with farm layout examples		and its protective function • Demonstrate the first aid procedure for a cut from a farm tool • Record the steps followed and materials used • Prepare a farm safety improvement plan: list three high-priority hazards, propose one corrective action each and estimate cost of implementation	spraying task • Record each PPE item and its protective function • Demonstrate the first aid procedure for a cut from a farm tool • Record the steps followed and materials used • Prepare a farm safety improvement plan: list three high-priority hazards, propose one corrective action each and estimate cost of implementation	
General Objective 7.0: Know how to develop a career and professional development plan in organic agriculture						
14-15	7.1 Describe career pathways for ND Organic Agricultural Technology graduates: farm technician, supervisor, extension agent, input dealer, certification assistant and agripreneur 7.2 Explain the professional competencies required for each career pathway	• Describe each career pathway with Nigerian organic sector job examples • Explain competencies for each pathway • Explain the profile of relevant professional bodies and membership requirements • Explain CPD	Career pathway chart, professional competency descriptions, professional body profiles, CPD opportunity list, CV and cover letter	• Prepare a personal career plan for the next five years: select one pathway, specify three professional goals, list three skills to develop and identify one network to join • Prepare a CV for an entry-level organic agriculture position:	Guide students to: • Prepare a personal career plan for the next five years: select one pathway, specify three professional goals, list three skills to develop and identify one network to join • Prepare a CV for an	Sample career plan template, CV template, cover letter template, sample organic agriculture job advertisements, professional body profiles, projector for presentations, field notebooks,

	7.3 Describe professional bodies relevant to organic agriculture technicians: NIAS, NSAP, NOAN, OAPTIN, ORAIN, etc. 7.4 Explain continuing professional development (CPD): training, networks, field days and certifications 7.5 Explain how to write a CV and cover letter for an organic agriculture job application in Nigeria	opportunities for organic agriculture technicians • Explain how to write a CV and cover letter for an organic agriculture position	template, projector, marker board, etc.	include personal information, education, skills, practical experience and referees • Prepare a cover letter for a specific organic agriculture job advertisement provided by the lecturer: explain your suitability in no more than one page • Present your career plan to the class in 3 minutes: including your chosen pathway, most important skill gained and next professional development step after graduation	entry-level organic agriculture position: include personal information, education, skills, practical experience and referees • Prepare a cover letter for a specific organic agriculture job advertisement provided by the lecturer: explain your suitability in no more than one page • Present your career plan to the class in 3 minutes: including your chosen pathway, most important skill gained and next professional development step after graduation	smartphone, etc.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

LIST OF MINIMUM RESOURCES / PHYSICAL FACILITIES**A. LABORATORIES****1. GENERAL BIOLOGY / MICROBIOLOGY / PATHOLOGY / PARASITOLOGY**

S/N	ITEM	QUANTITY
1.	Compound microscope	10
2.	Simple microscope / magnifying glass	10
3.	Autoclave	1
4.	Refrigerator	1
5.	Incubator	1
6.	Water bath	1
7.	Electronic balance	2
8.	Centrifuge (electric or manual)	1
9.	Staining troughs	10
10.	Specimen bottles	20
11.	Insect nets	15
12.	Insect cages and cabinets	5
13.	Cool boxes	5
14.	Platinum wire loops	20
15.	Milk sampling outfit	2
16.	Colony counter	1
17.	Lamps	5
18.	Petri dishes (for bioassay and microbiology practicals)	30
19.	Mist net	10
20.	Oven	1
21.	Anaerobic jar	21

2. GENERAL CHEMISTRY / ANIMAL AND PLANT NUTRITION

S/N	ITEM	QUANTITY
1.	Centrifuge (Electric/ manual)	2
2.	Water bath (with rings & thermostat)	1 each
3.	Kipps Apparatus	1

4.	Column chromatograph / High Performance Liquid chromatograph (HPLC)	2
5.	Distillation apparatus	2
6.	Flame photometer	1
7.	Flame cupboard	2
8.	Hot plate	2
9.	Oven (Electric)	2
10.	Spectrophotometer (uv)	1
11.	Bunsen burner	30
12.	Electrophoresis equipment	1
13.	Manesty water distiller	1
14.	Vacuum pump	1
15.	Magnetic stirrer	2
16.	Rotary shaker	1
17.	Thermometer	20
18.	Heating mantle	2
19.	Khajeldhal Apparatus	1
20.	Paper chromatograph	2
21.	pH meter	2
22.	Balance (top Loading)	5
23.	Distillation apparatus	2
24.	Bomb Calorimeter	1
25.	Water sterilizer	1
26.	Soxhlet extraction apparatus	1
27.	Lovibond comparator	1
28.	Flash point	1
29.	Voltammeter (H-type/copper)	2 each
30.	Centrifuge	1
31.	Chemical balance	2
32.	Desiccator	2
33.	Pestle and mortar	2
34.	Flask shaker	2
35.	Grinder/blender	1
36.	Colorimeter	1

3. SOIL LABORATORY

S/N	ITEM	QUANTITY
1.	Drying oven soil	2
2.	pH Meter	3
3.	Electric furnace	1
4.	Electronic Balance	4
5.	Beam balance	2
6.	Soil sieve (0.2mm mech.)	20
7.	Soil sedimentation apparatus	2
8.	Soil humidity determination apparatus	2
9.	Soil testing outfit	3
10.	Soil augers	30
11.	Humidity cabinet	1
12.	Soil moisture meter / Sensors	2
13.	Soil salt tester	1
14.	Flame photometer	1
15.	Spectrophotometer	1
16.	Kjedhal apparatus	1
17.	Nodule counter	1
18.	Micro-digester for N	2
19.	Colorimeter	2
20.	Water quality checker	1
21.	Cation exchange capacity determination apparatus	1
22.	Drying oven (plants)	1
23.	Vacuum pumps	1
24.	Sieve shaker (small)	3
25.	Bottle shaker	3
26.	Water bath	3
27.	Atomic Absorption Spectrophotometer (AAS)	1
28.	Soil capillarity determination apparatus	1
29.	Soil carbon determination apparatus	1
30.	Nematode detector	1

31.	Tetra Probe Soil Moisture Monitor	1
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B. STUDIO / AUDIO VISUAL

1. AUDIO VISUAL ROOM / FACILITIES

S/N	ITEM	QUANTITY
1.	Video recorder	2
2.	Multimedia projector	2
3.	Magnetic board	2
4.	Public address system	2
5.	Smart Television Set	2
6.	Cameras	5
7.	Enlarger / Magnifying lens	5
8.	Digital printers	5
9.	Tables for drawing	10
10.	Water colours	20
11.	Drawing pencils	100
12.	Drawing pens	100
13.	Virtual Lab Software	1
14.	Display cabinets and boards	5
15.	Computers	5
16.	Extension box	5

C. WORKSHOPS

1. FARM MACHINERY SHED

S/N	ITEM	QUANTITY
1.	Tractors	4
2.	Disc plough	4
3.	Disc harrows	4
4.	Disc ridgers	4
5.	Power tillers with complete implements	4
6.	4-wheeled trailer	2
7.	Stump jumper	5
8.	Earth scoop	1

9.	Rotovators	1
10.	Versatile cultivators	1
11.	Mould board ridger	2
12.	Tractor wheel	2
13.	Tractor pulley	2
14.	Versa file seed loader	2
15.	Seed drill	2
16.	Combine harvester	1
17.	Seed cleaner	1
18.	Seed grader	2
19.	Hay baler	1
20.	Cutter bay mower	1
21.	Rotary slasher	1
22.	Fertilizer spreader	1
23.	Multi-crop thresher	2
24.	Forage shredder with cut hood Sub-soiler	1
25.	Versatile mouldboard plough	2
26.	Manual Planters	3
27.	Spike toothed harrow	2
28.	Rice planter	2
29.	Root cutter	1
30.	Interrow weeder	2
31.	Manure spreader	1
32.	Oscillatory belt	1
33.	Belt Conveyor	1
34.	Bucket elevator	1
35.	Screw belt	1
36.	Pneumatic conveyor	1
37.	Auger conveyor	2
38.	Grain moisture meter	2
39.	Grain air flow meter	2
40.	General purpose elevator	1

2. CROP PROCESSING AND STORAGE FACILITIES

S/N	ITEM	QUANTITY
1.	Rice milling machine	1
2.	Multi-purpose 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.	Cassava presser	2
11.	Garri toaster	2
12.	Silos	Various size
13.	Cribs	Various size
14.	Yam barns	Various size
15.	Rhumbus	Various size
16.	Refrigerated warehouse	Various size
17.	Paper bags	200
18.	Waxes	50
19.	Basket	200
20.	Plastics Crates	50
21.	Sorting machines	5
22.	Size graders	2
23.	Weight graders	2
24.	Cleaning troughs	3
25.	Slicing machines	2
26.	De-stoner	2
27.	Low temperature drier/blower	2
28.	Refractometer	5
29.	Penetrometer	5

WOOD WORK / METAL WORK / MAINTENANCE WORKSHOP

1. Wood Work Section

S/N	ITEM	QUANTITY
1.	Working benches with vices	10
2.	Band saw	1
3.	Surface planer	1
4.	Thickness planer	1
5.	Drilling machine (bench)	1
6.	Hand tools set: saws, chisels, try square, gauges, rulers, screwdrivers, hammers, planes, etc.	10

2. Metal Work Section

S/N	ITEM	QUANTITY
1.	Lathe machine	1
2.	Pipe benders	3
3.	Anvils	3
4.	Micrometers (insides, outside)	2
5.	Stock and dice set	5
6.	Drill sets	5
7.	Electrical hand drills	2
8.	Hydraulic jack 12 and 15 tons	1 each
9.	Tool boxes	3
10.	Battery charger	1
11.	Grease gun	2
12.	Pipe cutters	2
13.	Laser machine	1
14.	Scribers	1
15.	Steel ruler	5
16.	Mallet sets	2
17.	Pipe screwing – threading	2
18.	Arch welding equipment	2
19.	Working benches	8
20.	Electric grinder	2
21.	Welding gloves	15
22.	Welding helmet	15
23.	Wire brush	5

24.	Welding boots and screen Soldering equipment	15
25.	Blow torch	4
26.	Tin snips	4
27.	Soldering flux	4
28.	Sheet metal sheer	4
29.	Mallet hammer	4
30.	Hack saw	4
31.	Oxygen and acetylene bottles	2
32.	Oxygen and acetylene regulator	2
33.	Cylinder wrenches	3
34.	Spark lighter	5

3. Maintenance Workshop

S/N	ITEM	QUANTITY
1.	Tool boxes	5
2.	Hydraulic jack	2
3.	Service pit	1
4.	Teaching model or scraps of: tractor engines, trailers, ploughs and other farm implements	At least 1 each

D. FIELD FACILITIES

1. PEST CONTROL EQUIPMENT

S/N	ITEM	QUANTITY
1.	Knapsack pressure sprayer	2
2.	Motorized mist sprayer	1
3.	Handy sprayer	5
4.	Hand sprayer with container	5
5.	Solar/Battery Powered Sprayer	2
6.	Flood jet nozzles (1.5 Ok)	4
7.	Boom sprayer	2
8.	Flame weeder	2
9.	Colony counter	2
10.	Colony illuminator	2
11.	Fumigation sheets/envelopes	5

12.	Light trap	10
13.	Net trap	10
14.	Pheromone trap	10
15.	Insect boxes	10
16.	Protective Eye glasses / goggle	20
17.	Personal Protective Equipment (PPE)	20
18.	Duster applicator	5
19.	Granule applicator	5

2. SURVEYING AND FIELD MAPPING EQUIPMENT

S/N	ITEM	QUANTITY
1.	Stereoscope	4
2.	GPS	5
3.	Prismatic compass	3
4.	Ranging pole	8
5.	Survey Chain	2
6.	Metric tape	2
7.	Drawing board	10
8.	Protractors	10
9.	Planimeter	1
10.	Theodolite	1
11.	Scale rule	15
12.	Set Square	10
13.	Set of arrows	30
14.	Damping Levels	4
15.	Abney Level	2
16.	T- square	10
17.	Pantograph	10
18.	Wheel tape	2

3. METEOROLOGICAL STATION

S/N	ITEM	QUANTITY
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S/N	ITEM	QUANTITY
1.	Stevenson's screen	1
2.	Maximum and minimum thermometer	2
3.	Rain gauge	2
4.	Measuring cylinders	5
5.	Wind vane	1
6.	Anemometer	1
7.	Hygrometer	2
8.	Barometer	1
9.	Evaporimeter	2
10.	Thermohydrograph	1
11.	Automated weather station (where affordable; otherwise use NIMET data online)	1

4. NURSERY TOOLS

S/N	ITEM	QUANTITY
1.	Watering cans	15
2.	Watering system (spraying)	2
3.	Nursery trays (plastic)	20
4.	Nursery bags / polybags (assorted sizes)	200
5.	Secateurs / pruning shears	10
6.	Budding and grafting knife	5
7.	Hand trowel	15
8.	Planting hoes	15
9.	Spades	10
10.	Rakes	10
11.	Wheelbarrows	5
12.	Head pans	10
13.	Machetes / cutlass	15
14.	Root pruners	5
15.	Plant lifters	5
16.	Scissors	5
17.	Shade netting	Sufficient for nursery bed
18.	Pick axe	5
19.	Seed sowers	5

S/N	ITEM	QUANTITY
20.	Gardening line	10
21.	Dibbler	10

5. IRRIGATION EQUIPMENT

S/N	ITEM	QUANTITY
1.	Sprinkler irrigation kit 2,000 Hose	15
2.	Drip irrigation Kit for 1 ha	5
3.	Rotating sprinkler for 2 ha	10
4.	Big boss irrigation gun for 8 ha	10
5.	Centre pivot irrigation system for 4 ha	1
6.	Flow meter	2
7.	Irrigation water quality measuring equipment	2
8.	Water pump (2,3 and 5 inch)	1
9.	Solar/Battery powered water pump	2
10.	Weir	20
11.	Flumes	20
12.	Tetra Soil Probes	1
13.	Moisture Sensors	10
14.	Measuring tapes	10
15.	Artificial lake	1
16.	Rain water harvesting storage facilities	2
17.	Tensiometers	50
18. 18	Lysimeters	2
19. 19	Pan evaporator	2
20. 20	PVC pipe ($1\frac{1}{2}$, $\frac{3}{4}$, 1, 2, and 3 inch)	100
21. 21	Siphon tubes	50

6. COMPOSTING AND BIOFERTILIZER PRODUCTION EQUIPMENT

S/N	ITEM	QUANTITY
1.	Thermometer (compost)	5
2.	Moisture meter	3

S/N	ITEM	QUANTITY
3.	Weighing scale (50 kg)	3
4.	Spades and forks for pile turning	10
5.	Compost bins or designated composting bays (minimum 3)	3
6.	Vermicomposting bins or boxes	5
7.	Bokashi fermentation containers with airtight lids	5
8.	EM solution starter kit	2
9.	Fermentation containers (assorted sizes)	10
10.	pH test strips	50
11.	Germination trays for compost maturity bioassay	10
12.	Test seeds for bioassay (cress or similar)	Sufficient stock
13.	Refractometer (for honey, milk and liquid biofertilizer quality testing — dual use)	2
14.	Measuring cylinders (500 ml and 1 litre)	10
15.	Extraction containers and filtration cloth for botanical and ethno-veterinary preparations	10
16.	Metal drum (for biochar production from crop residues)	2

E. ORGANIC FARMS

1. CROP FARM (TEACHING AND COMMERCIAL)

S/N	ITEM	QUANTITY
1.	Organic nursery	2 ha
2.	Horticultural farm (organic vegetables, herbs and spices)	3 ha
3.	Orchard (fruit trees)	2 ha
4.	Pasture and fodder crop area	5 ha
5.	Cereal and legume crop farm (maize, sorghum, cowpea, groundnut)	5 ha
6.	Root and tuber crop farm (yam, cassava, sweet potato)	3 ha
7.	Composting area with at least three bays	1 unit
8.	Organic fertilizer store	1 unit
9.	Manure store	1 unit
10.	Implement store	1 unit
11.	Herb and botanicals garden (including ethno-veterinary and pest control plants: neem, moringa, garlic, ginger, aloe vera, African basil, tithonia, chilli pepper, etc.)	1 unit
12.	Cover crop seed bank	1 unit
13.	Agroforestry demonstration strip (alley cropping or windbreak)	1 unit
14.	Multipurpose tree seedling nursery (Gliricidia, Leucaena, Moringa, Faidherbia albida — standing stock for	Minimum 50 seedlings

S/N	ITEM	QUANTITY
	agroforestry and silvopastoral practicals)	
15.	Centre pivot or drip irrigation system	1 unit
16.	Manure curing unit	1 unit

Note: A minimum organic demonstration farm of 2 hectares total is recommended. Larger institutions should scale accordingly.

2. ORGANIC ANIMAL FARM (TEACHING AND COMMERCIAL)

S/N	ITEM	QUANTITY
1.	Layer poultry unit (birds)	200
2.	Broiler / local chicken unit (birds)	200
3.	Brooder unit	1 unit
4.	Hatchery	1 unit
5.	Incubators	2
6.	Goat unit (does and buck)	20
7.	Sheep unit (ewes and ram)	20
8.	Rabbit unit	30
9.	Piggery (sows and boar)	10
10.	Beef cattle	10 head
11.	Snailary (snails)	100
12.	Beehive unit — Kenya Top Bar Hive or Langstroth (minimum)	5
13.	Beekeeping protective suits (full body)	5
14.	Beekeeping smoker	3
15.	Hive tool	5
16.	Bee brush	3
17.	Honey uncapping knife	2
18.	Honey extractor (manual)	1
19.	Dairy cattle (where available)	As available
20.	Hay barn	1 unit
21.	Silage pit or silage bags	1 unit
22.	Slaughter slab with basic processing equipment	1 unit
23.	Dip slab	1 unit
24.	Milking parlour (basic)	1 unit
25.	Store: watering troughs, feeding troughs, castration kit, dehorning kit, tagging equipment, weighing scale	1 unit
26.	FAMACHA colour chart	3

S/N	ITEM	QUANTITY
27.	Clinical thermometer	5
28.	Stethoscope	2
29.	Vaccination and injection equipment	Sufficient stock

Note: Livestock numbers are recommended minimum teaching herd sizes. Priority species are poultry, small ruminants and beekeeping. Institutions with limited resources may start with a subset and scale up.

4. OTHERS

S/N	ITEM	QUANTITY
1.	Feed mill with accessories	1 unit
2.	Greenhouse (basic)	1
3.	Fish pond (earthen or concrete)	1
4.	Fish water quality test kit (pH, dissolved oxygen, temperature, turbidity)	2
5.	Seine net or cast net (for fish pond harvesting)	2
6.	Organic Agriculture sales outlet	1 unit
7.	Beehive shelf / storage	5
8.	Honey extraction unit (extractor, strainer, jars)	1 unit
9.	Cassava processing unit (grater and press)	1 unit
10.	Cold storage room or refrigerator (for perishable organic produce)	1
11.	Digital marketing corner (smartphones, internet connection, table and chairs)	1 unit
12.	Green house	1

LIST OF WORKSHOP PARTICIPANTS

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