

NATIONAL BOARD FOR TECHNICAL EDUCATION

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

HIGHER NATIONAL DIPLOMA

IN

ORGANIC ANIMAL PRODUCTION 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)

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 members of the agriculture, 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

Higher National Diploma (HND) Organic Animal Production Technology.

2.0 PROGRAMME GOAL

The Higher National Diploma in Organic Animal Production Technology is designed to produce Animal Production Technologists with the competence to supervise, coordinate and manage organic livestock production workplaces and their value chain sustainably.

3.0 OBJECTIVES OF THE PROGRAMME

At the end of the programme, the diplomates should be able to:

i) Carry out Organic Animal Production duties and other value chain functions;
ii) Carry out Organic Animal Production activities in relevant industries and service delivery;
iii) Relate with other Professionals in the delivery of Organic Animal Production services;
iv) Initiate Programmes and Projects in various areas of Organic Animal Production;
v) Carry out Organic Animal Production functions in relevant schools of Agriculture and research institutions;
vi) Conduct Organic Animal Production services and promotion activities in schools, industries and communities;
vii) Implement Organic Animal production standards, ethics and guidelines;
viii) Carry out record keeping, data collection, analysis and reporting;
ix) Design and manage an organic animal enterprise.

4.0 ENTRY REQUIREMENTS

The minimum entry requirements into the HND Organic Animal Production Technology programme are:

i) Candidates with National Diploma in Organic Agriculture, Agricultural Technology, Animal Health and Production Technology with at least Lower Credit, from accredited programmes/institution.
ii) Must have undergone one (1) year post-ND industrial training experience;
iii) Candidates with a Pass grade at the ND Level with two (2) or more years post-ND cognate work experience may be considered for admission;
iv) Credit passes in five ordinary level subjects in not more than two sittings including Mathematics, English Language and three other relevant subjects.

5.0 STRUCTURE/DURATION OF THE PROGRAMME

The HND Organic Animal Production Technology is a terminal programme structured to last for two (2) years (four semesters) of classroom work, laboratory, field trip and workshop practices in relevant MDAs or Units.

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

i) 15 contact weeks of teaching (i.e., lectures and practical sessions etc.) and

ii) 2 weeks for registration, tests, quizzes and examinations.

6.0 CURRICULUM:

The HND Organic Animal Production Technology programme consists of four (4) main components:

a. General studies/General education courses
b. Foundation courses
c. Professional courses
d. Project work

7.0 STAFFING REQUIREMENTS:

4.1 Core Teaching Staff

A minimum of four (**4**) Core Lecturers who should be Lecturer II or above staff, with a minimum qualification of HND/B.Sc in Animal production/Animal science or related disciplines.

4.2 Headship of the Department (HOD)

The Head of Department shall have at least a First and Master's degrees in Animal production/Animal science or related fields. He or she shall not be below the rank of a Senior Lecturer, must be registered with the relevant professional body and must have a minimum of twelve (12) years experience in both academic and industry.

4.3 Technical Staff

There should be technical staff:

i) Technologist

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

ii) Technician

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

iii) Farm Assistants

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

8.0 CERTIFICATION

A diplomate of this Programme shall be awarded the Higher National Diploma (HND) in Organic Animal Production Technology.

9.0 AWARD OF HIGHER NATIONAL DIPLOMA (HND)

The Higher National Diploma certificate in Organic Animal Production Technology shall be awarded by the authority of the Academic Board of the institution under the following conditions:

i) Satisfactory performance in all prescribed course work/assignments, tests/quizzes, workshop practice, laboratory work, field trips, etc.;
ii) Satisfactory performance in all semester examinations;
iii) Satisfactory completion of written project/seminar papers.

4.1 Conditions for the Award of HND:

Institutions offering accredited programmes will award the Higher National Diploma to candidates who successfully completed the programme after passing the prescribed course-work, examinations, diploma project etc. 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	0.00

9.2 Classification of Diplomas:

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

10.0 ACCREDITATION OF PROGRAMME

The Organic Animal Production Technology shall be accredited by the NBTE before the diplomates are awarded the certificates. Details about the process of accrediting a programme for the award of HND are available from the Board's website web.nbte.gov.ng or through correspondence to: The Executive Secretary, NBTE, Plot 'B' Bida Road, P.M.B 2239, Kaduna, Nigeria.

11.0 LOGBOOK

A personal logbook for each course is to be kept by the students. It shall contain all the recordings of the day-to-day, weekly and semester practical works/activities from day one to the end of the programme. This is to be checked, marked appropriately and endorsed by all lecturers concerned at the end of every week.

12.0 FINAL YEAR PROJECTS

Final year students are expected to carry out project work, either on individual or group basis (not more than 2 per group). The project topics should as much as possible be related to the programme and serve as useful tools for further Research and /or Development. Projects should be properly supervised, and their reports well presented. The Institution should develop formats for presenting and grading projects. The formats should be adopted as applied to each stakeholder.

13.0 GUIDANCE NOTES FOR TEACHERS OF THE PROGRAMME

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

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

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

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

14.0 GUIDELINES ON MANDATORY SKILLS QUALIFICATIONS (MSQ)

Please, refer to NBTE guidelines for implementation of MSQ in Polytechnics. This can be downloaded from NBTE website (web.nbte.gov.ng)

CURRICULUM TABLE

Year I- Semester I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 301	Communication in English III	2	0	0	2	2
2.	MSQ 311	Principles of Quality Assurance Assessment	1	0	1	2	2
3.	AED 312	Agricultural Extension Methods	1	0	2	3	3
4.	OAP 311	Principles of Organic Agriculture	1	0	2	3	3
5.	OAP 312	Soil Microbiology and Composting	1	0	3	4	4
6.	OAP 313	Organic Pasture and Forage Production	1	0	3	4	4
7.	OAP 314	Climate-Smart Farm Mechanization	1	0	3	4	4
8.	OAP 315	Animal Anatomy	1	0	2	3	3
9.	OAP 316	Animal Physiology	1	0	3	4	4
10.	OAP 317	Organic Farm Practice I	0	0	4	4	4
11.	OAP 318	Computer Applications in Organic Farming	1	0	1	2	2
TOTAL			**11**	**0**	**24**	**35**	**35**

Year I- Semester II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 302	Use of English III	2	0	0	2	2
2.	ENT 326	Practice of Entrepreneurship I	2	0	2	4	4
3.	AGR 302	Field Experimentation and Data Analysis	1	0	2	3	3
4.	MSQ 321	Principles of Quality Assurance Assessment	1	0	1	2	2
5.	OAP 321	Organic Standards and Certification	1	0	2	3	3
6.	OAP 322	Organic Farm Management	1	0	2	3	3
7.	OAP 323	Organic Farm Practice II	0	0	4	4	4
8.	OAP 324	Organic Animal Nutrition	1	0	3	4	4
9.	OAP 325	Organic Small Ruminant Production	1	0	3	4	4
10.	OAP 326	Organic Mini-Livestock Production	1	0	2	3	3
11.	OAP 327	Indigenous Breeds and Conservation Genetics	1	0	2	3	3
TOTAL			**12**	**0**	**23**	**35**	**35**

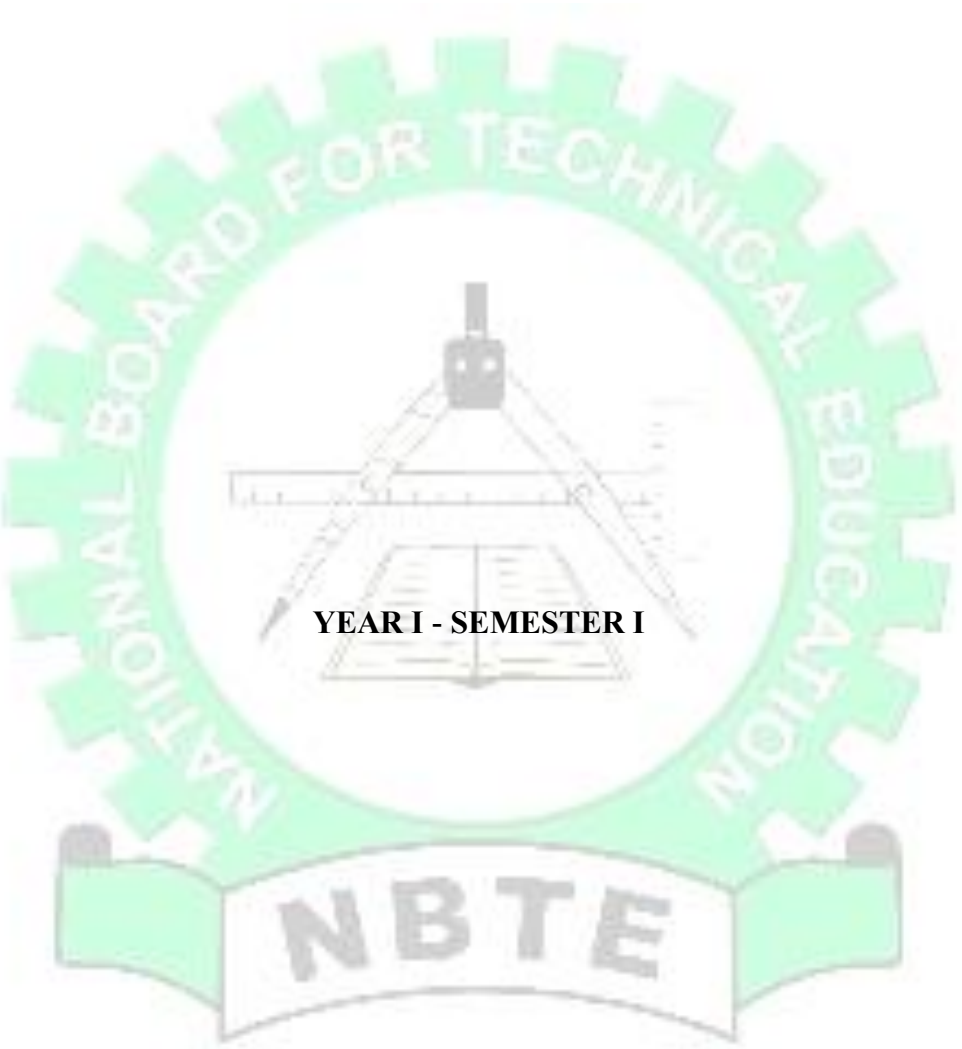
Year II- Semester I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 401	Communication in English	2	0	0	2	2
2.	ENT 416	Practice of Entrepreneurship II	2	0	2	4	4
3.	AGR 401	Research Methodology and Scientific Writing	1	0	1	2	2
4.	AFT 414	Integrated Fish Farming	1	0	2	3	3
5.	OAP 411	Organic Animal Health Management	1	0	3	4	4
6.	OAP 412	Organic Pasture and Range Management II	1	0	2	3	3
7.	OAP 413	Organic Poultry Production	1	0	3	4	4
8.	OAP 414	Organic Swine Production	1	0	2	3	3
9.	OAP 415	Ethno-Phyto Medicine and Nutraceutical Therapy	1	0	2	3	3
10.	OAP 416	Organic Apiculture and Hive Products	1	0	2	3	3
TOTAL			**12**	**0**	**19**	**31**	**31**

Year II- Semester II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	OAP 421	Applied Organic Animal Nutrition	1	0	2	3	3
2.	OAP 422	Organic Beef Cattle Production	1	0	3	4	4
3.	OAP 423	Organic Animal Disease Prevention	1	0	2	3	3
4.	OAP 424	Organic Dairy Cattle Production	1	0	3	4	4
5.	OAP 425	Climate Sustainability and Ethics	1	0	3	4	4
6.	OAP 426	Organic Hides, Skin and Leather Processing	1	0	2	3	3
7.	OAP 427	Project	0	0	4	4	4
TOTAL			**6**	**0**	**19**	**25**	**25**

KEY: L - Lectures (Hours/week), T - Tutorials(Hours/week), P -Practical(Hours/week), CU - Credit Unit, CH - Contact Hour (Hours/Week)



YEAR I - SEMESTER I

PRINCIPLES OF ORGANIC AGRICULTURE

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF ORGANIC AGRICULTURE	**COURSE CODE: OAP 311**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills of organic agriculture's philosophical, ecological, scientific, social and economic foundations.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the history and philosophy of organic agriculture; 2.0 Know the four IFOAM Principles of Organic Agriculture; 3.0 Know organic, conventional, sustainable, agro-ecological, biodynamic and regenerative agriculture systems; 4.0 Understand ecosystem services and agroecology; 5.0 Understand the environment-plant-animal continuum and the central role of healthy soil in organic systems; 6.0 Understand organic animal husbandry principles; 7.0 Understand the Nigerian organic sector; 8.0 Understand global organic markets, regulations and certification; 9.0 Understand the future and challenges of organic agriculture in Nigeria.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF ORGANIC AGRICULTURE	COURSE CODE: OAP 311	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills of organic agriculture's philosophical, ecological, scientific, social and economic foundations.		
GENERAL OBJECTIVE 1.0: Understand the history and philosophy of organic agriculture;		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define organic agriculture 1.2 Outline the early roots of organic thinking 1.3 Outline the 1972 founding of IFOAM 1.4 Outline the 1980s–1990s growth of organic Agriculture in Europe and North America regulation 1.5 Outline organic agriculture in Africa	• Explain organic agriculture • Discuss the early roots of organic thinking • Explain the 1972 founding of IFOAM • Discuss the 1980s–1990s growth of organic Agriculture in Europe and North America regulation • Discuss organic agriculture in Africa	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Identify traditional Nigerian farming practices that are inherently organic (e.g. composting, intercropping, fallowing, free-range systems etc. • Write a 1-page reflection on a video documentary on organic agriculture (e.g. "The Future of Food", "Catena of the Soil" • Visit (or virtual tour) of an organic farm in Nigeria;	Guide students to; • Identify traditional Nigerian farming practices that are inherently organic (e.g. composting, intercropping, fallowing, free-range systems, etc). • Write a 1-page reflection on a video documentary on organic agriculture	Documentary video. Reflection writing prompts. Transport for farm visit. Timeline poster materials.

	and Nigeria 1.6 Describe motivations for organic Agriculture 1.7 Describe criticisms and debates around organic Agriculture	and Nigeria • Explain motivations for organic Agriculture • Explain criticisms and debates around organic Agriculture		document its history and motivation. • Develop a Timeline of major events in organic agriculture history with Nigerian context.	(e.g. "The Future of Food", "Catena of the Soil" • Visit (or virtual tour) of an organic farm in Nigeria; document its history and motivation. • Develop a Timeline of major events in organic agriculture history with Nigerian context.	
GENERAL OBJECTIVE 2.0: Know the four IFOAM Principles of Organic Agriculture						
2	2.1 Explain the principle of health 2.2 Describe the IFOAM Principle of Ecology 2.3 Explain the IFOAM Principle of Fairness. 2.4 Describe the IFOAM Principle of care 2.5 Describe principles in livestock practice. 2.6 Describe the linkage between the four IFOAM principles and the UN Sustainable	• Explain the principle of health • Discuss the IFOAM Principle of Ecology • Explain the IFOAM Principle of Fairness. • Discuss the IFOAM Principle of care • Explain principles in livestock practice. • Explain the linkage between the four IFOAM principles and the UN Sustainable	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Analyse three real-world organic farming dilemmas (e.g. sick animal needing antibiotic, economic pressure to overstock) using the four principles. • Write a technical report on IFOAM in line with the country side adopted principles and of the UN sustainable development goals	Guide students to: • Analyse three real-world organic farming dilemmas (e.g. sick animal needing antibiotic, economic pressure to overstock) using the four principles. • Write a technical report on IFOAM in line with the country side adopted principles and of the	IFOAM Principles document. Case-study handouts. Debate timer. Reflection prompts.

	Development Goals (SDGs). 2.7 Explain the philosophical foundations. 2.8 Describe how the four principles guide ethical decisions	Development Goals (SDGs). • Explain the philosophical foundations. • Discuss the four principles guiding ethical decisions			UN sustainable development goals	
GENERAL OBJECTIVE 3.0: Know organic, conventional, sustainable, agroecological, biodynamic and regenerative agriculture systems.						
3-4	3.1 Define conventional agriculture. 3.2 Define sustainable agriculture. 3.3 Explain agroecology application of ecological principles to agriculture; FAO 10 elements of agroecology. 3.4 Define biodynamic agriculture 3.5 Define regenerative agriculture 3.6 Define permaculture. 3.7 Describe overlap 3.8 Describe consumer perception and product differentiation in	• Explain conventional Agriculture. • Explain sustainable agriculture. • Discuss agroecology application of ecological principles to agriculture; FAO 10 elements of agroecology. • Explain biodynamic agriculture • Explain regenerative agriculture emphasis on soil regeneration, holistic grazing • Explain permaculture. • Explain overlap and complementarity organic regenerative,	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Develop a comparison matrix of the 6 systems across 10 criteria. • Identify Nigerian farms practicing conventional, organic and agro ecological systems. • Document differences. • Assess a Nigerian farm and recommend the most appropriate system given context (capital, land, labour, market access). • Review a Demeter-certified biodynamic farm video • Write a technical report on applicability of biodynamic agriculture in	• Guide students to: • Develop a comparison matrix of the 6 systems across 10 criteria. • Identify Nigerian farms practicing conventional, organic and agro ecological systems. • Document differences. • Assess a Nigerian farm and recommend the most appropriate system given context (capital, land, labour, market access). • Review a Demeter-	Comparison matrix template. Transport for visits. Case-study Materials. Video clips.

	Nigerian markets.	organic-agro-ecological, organic-biodynamic. • Explain consumer perception.		Nigeria.	certified biodynamic farm video • Write a technical report on applicability of biodynamic agriculture in Nigeria.	
GENERAL OBJECTIVE 4.0: Understand ecosystem services and agroecology						
5	4.1 Define ecosystem 4.2 Explain provisioning services. 4.3 Describe regulating services 4.4 Explain supporting services 4.5 Discuss cultural services 4.6 Explain bio-diversity levels 4.7 Describe organic ecosystem 4.8 Describe carbon sequestration 4.9 Describe agroecology and the FAO 10 elements	• Explain ecosystem services per Millennium Ecosystem Assessment (MEA) provisioning, regulating, supporting and cultural. • Explain provisioning services. • Explain regulating services. • Explain supporting services. • Explain cultural services. • Explain biodiversity levels at three levels genetic, species, ecosystem; alpha, beta, gamma diversity. • Explain how organic	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Conduct a biodiversity walk on the institution farm. • Identify plant, insect and bird species; • Record alpha diversity. • Map ecosystem services provided by the institution farm using the MEA framework. • Compute soil organic-carbon content from sample data. • Estimate carbon sequestration potential. • Assess one Nigerian farm against the FAO 10 elements of agroecology.	Guide students to: • Conduct a biodiversity walk on the institution farm; • Identify plant, insect and bird species; • Record alpha diversity. • Map ecosystem services provided by the institution farm using the MEA framework. • Compute soil organic-carbon content from sample data; • Estimate carbon sequestration potential. • Assess one Nigerian	Field notebooks, identification guides. Ecosystem-services mapping template. Soil-test kit, calculator. FAO assessment tool.

		agriculture enhances ecosystem services compared to conventional. • Explain carbon sequestration. • Explain FAO 10 elements of agro-ecology.			farm against the FAO 10 elements of agroecology.	
GENERAL OBJECTIVE 5.0: Understand the environment-plant-animal continuum and the central role of healthy soil in organic systems.						
6	5.1 Describe the environment-plant-animal continuum 5.2 Explain environment as a living system 5.3 Explain soil health indicators 5.4 Describe nutrient flow from soil to plant to animal back to soil. 5.5 Explain how plant nutrition affects animal nutrition 5.6 Describe how animal management affects soil 5.7 Describe the legume-rhizobium symbiosis.	• Discuss soil-plant-animal continuum. • Explain soil as living system. • Explain soil health indicators. • Explain nutrient flow cycle. • Explain plant nutrition to animal nutrition. • Discuss animal management to soil. • Explain legume-rhizobium symbiosis as the keystone of organic N fertility • Explain mycorrhizal symbiosis.	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Collect soil samples from different farm locations • Conduct basic tests (pH, texture, organic matter). • Examine legume root nodules under microscope • Identify rhizobium activity. • Assess soil compaction, earthworm, other related soil organism count and root development in different paddocks. • Design a nutrient-flow map for an organic mixed-livestock-crop farm.	Guide students to; • Collect soil samples from different farm locations • Conduct basic tests (pH, texture, organic matter). • Examine legume root nodules under microscope • Identify rhizobium activity. • Assess soil compaction, earthworm, other related soil organism count and root development in	Soil augers, soil-test kit. Microscope, slides. Earthworm-counting tools. Mapping paper, markers.

	5.8 Describe mycorrhizal symbiosis 5.9 Explain Nigerian soil challenges	• Explain Nigerian soil challenges: erosion, acidification, fertility decline, salinity, etc.			different paddocks. • Design a nutrient-flow map for an organic mixed-livestock-crop farm.	
GENERAL OBJECTIVE 6.0: Understand organic animal husbandry principles						
7-8	6.1 Describe the eight principles of organic livestock husbandry per IFOAM Standard: 6.2 Outline the differences between organic and conventional husbandry. 6.3 Explain the Five Domains animal-welfare framework as applied to organic animal production 6.4 Explain organic poultry production 6.5 Describe organic Cattle production 6.6 Describe organic pig production 6.7 Describe organic small-ruminant production	• Explain the eight principles of organic livestock husbandry per IFOAM Standard: • Explain the differences between organic and conventional husbandry. • Explain the Five Domains animal-welfare framework as applied to organic animal production • Explain organic poultry production • Explain organic Cattle production • Explain organic pig production • Explain organic small-ruminant production • Explain organic micro	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Examine a sample organic poultry house and free-range assess against IFOAM principles. • Rate the institution farm livestock units against IFOAM 8 principles and identify gaps. • Design an organic broiler production protocol — stocking density, range access, slow-growing breed, organic feed. • Conduct a Five-Domains welfare audit on an organic-managed group. • Write a technical report on a study Visit (or virtual tour) of an organic cattle, poultry or pig farm in Nigeria. • Design a transition plan	Guide students to: • Examine a sample organic poultry house and free-range assess against IFOAM principles. • Rate the institution farm livestock units against IFOAM 8 principles and identify gaps. • Design an organic broiler production protocol — stocking density, range access, slow-growing breed, organic feed. • Conduct a Five-Domains welfare audit on an organic-managed group. • Write a technical	Institutional farm or photos. Welfare audit checklist (Five Domains). Broiler protocol template. Transition plan template. Transport for farm visit.

	6.8 Describe organic micro livestock production 6.9 Describe organic apiculture 6.10 Describe the transition period. 6.11 Describe documentation requirements	livestock production • Explain organic apiculture • Discuss the transition period. • Discuss documentation requirements		for a conventional farm wishing to convert to organic.	report on a study Visit (or virtual tour) of an organic cattle, poultry or pig farm in Nigeria. • Design a transition plan for a conventional farm wishing to convert to organic.	
GENERAL OBJECTIVE 7.0: Understand the Nigerian organic sector						
9-10	7.1 Describe the Nigerian Organic Agriculture Network (NOAN) 7.2 Describe the Nigerian Organic Agriculture Research and Advocacy (NOARA), 7.3 Describe the Federal Ministry of Livestock (FML), Agricultural Research Council of Nigeria (ARCN), NIAS, NAFDAC and SON roles in organic governance. 7.4 Explain Nigerian organic producers and	• Discuss the Nigerian Organic Agriculture Network (NOAN) • Explain NOARA and supporting orgs. • Discuss the Federal Ministry of Livestock Developments (FMLD) Agricultural Research Council of Nigeria (ARCN), NIAS, NAFDAC and SON roles in organic governance • Explain Nigerian organic producers. • Discuss Nigerian	Whiteboard Projector, Textbooks Charts Internet Marker Journal	• Visit (or virtual tour) of NOAN office or affiliated farm. • map the value chain of one Nigerian organic livestock product (e.g. organic egg or organic honey) from production to consumer • Review NOAN Standard for animal production and compare with IFOAM and EU 2018/848. • Interact with a Nigerian organic farmer (in person or online);	Guide students to: • Visit (or virtual tour) of NOAN office or affiliated farm. • map the value chain of one Nigerian organic livestock product (e.g. organic egg or organic honey) from production to consumer • Review NOAN Standard for animal production and compare with IFOAM and EU	Transport for visit. Value-chain mapping template. NOAN Standard document. Survey questionnaire. Projector, presentation board.

	brands 7.5 Describe Nigerian organic crops 7.6 Describe Nigerian organic livestock. 7.7 Describe Nigerian organic value chains 7.8 Describe Nigerian organic standards landscape. 7.9 Describe support institutions 7.10 Describe pioneer Nigerian organic agriculturists and their contributions	organic crops • Discuss Nigerian organic livestock. • Discuss Nigerian organic value chains. • Discuss organic standards landscape. • Discuss support institutions. • Discuss pioneer Organic Nigerian agriculturists and their contributions.		• Document motivation, practices, challenges and successes. • Present a Nigerian organic enterprise case study to class.	2018/848. • Interact with a Nigerian organic farmer (in person or online); • Document motivation, practices, challenges and successes. • Present a Nigerian organic enterprise case study to class.	
GENERAL OBJECTIVE 8.0: Understand global organic markets, regulation and certification						
11-12	8.1 Describe global organic market size. 8.2 Describe largest organic markets 8.3 Describe largest organic land area 8.4 Explain major certification standards 8.5 Describe equivalency and recognition 8.6 Describe certification	• Explain global organic market size. • Explain largest organic markets. • Explain largest organic land areas. • Explain certification standards. • Explain equivalency and recognition. • Explain certification	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Compare 3 major certification standards (IFOAM, USDA NOP, EU 2018/848) using a comparison table. • Identify five organic products likely to be exportable from Nigeria; • Map their target markets and certification needs. • Develop a basic	Guide students to: • Compare 3 major certification standards (IFOAM, USDA NOP, EU 2018/848) using a comparison table. • Identify five organic products likely to be exportable from Nigeria;	Standards documents. Comparison-table template. Mapping template. Application template. Transport for visit.

	process and costs 8.7 Explain trade routes for Nigerian organic exports 8.8 Explain AfCFTA and African organic trade opportunities. 8.9 Describe organic premium pricing 8.10 Explain digital certification innovations	process and costs. • Explain Nigerian export trade. • Explain AfCFTA opportunities. • Explain organic premium pricing. • Discuss digital certification innovations.		certification application for a hypothetical 50-cow Nigerian organic dairy. • Visit an organic export company.	• Map their target markets and certification needs. • Develop a basic certification application for a hypothetical 50-cow Nigerian organic dairy. • Visit an organic export company.	
GENERAL OBJECTIVE 9.0: Understand the future and challenges of organic agriculture in Nigeria						
13-15	9.1 Describe the climate change context 9.2 Describe the food security 9.3 Describe FAO's scaling-up agroecology initiative. 9.4 Describe IFOAM 2030 vision. 9.5 Describe African Union biodiversity and food-security policies. 9.6 Describe Nigerian National Agricultural Promotion Policy (NAPP) and Nigeria	• Discuss climate change context • Explain the food security • Explain FAO's scaling-up agroecology initiative. • Explain IFOAM 2030 vision • Explain African Union biodiversity and food-security policies. • Explain Nigerian National Agricultural Promotion Policy (NAPP) and Nigeria	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Develop a 5-year career plan integrating organic from conventional opportunities. • Draft a one-page policy brief on organic agriculture for the Federal Ministry of Livestock Development • Write a 2-page personal essay on why you chose organic animal production and your vision for the sector. • Use AI and other relevant tools to design	Guide students to: • Develop a 5-year career plan integrating organic from conventional opportunities. • Draft a one-page policy brief on organic agriculture for the Federal Ministry of Livestock Development • Write a 2-page personal essay on why you chose organic animal	Debate timer, rubrics. Career-plan template. Policy-brief template. Projector, presentation board.

	Agricultural Sector. 9.7 Describe youth participation potentials. 9.8 Describe women in organic Agriculture. 9.9 Describe technology in organic Agriculture. 9.10 Describe research and education needs in organic agriculture. 9.11 Describe career pathways.	Agricultural Sector. • Explain youth participation potential. • Explain women in organic • Discuss technology in organic • Discuss research and education needs in organic agriculture. • Discuss career pathways		presentation slides on various aspects of organic animal production in Nigeria	production and your vision for the sector. • Use AI and other relevant tools to design presentation slides on various aspects of organic animal production in Nigeria	

COURSE ASSESSMENT:

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

SOIL MICROBIOLOGY AND COMPOSTING

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: SOIL MICROBIOLOGY AND COMPOSTING	**COURSE CODE: OAP 312**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in soil microbiology and composting		

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

1.0 Understand soil as a living system and the basic ecology of soil microorganisms;
2.0 Know the classification of major groups of soil microorganisms;
3.0 Understand soil-plant-microbe interactions;
4.0 Know biological nitrogen fixation, phosphorus solubilizations and mycorrhizal symbiosis in organic systems;
5.0 Know the principles of composting;
6.0 Know composting methods;
7.0 Know compost quality assessment, application rates and timing in organic livestock production;
8.0 Know biofertilizers and bioinoculants;
9.0 Know soil-health monitoring methods.

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: SOIL MICROBIOLOGY AND COMPOSTING	COURSE CODE: OAP 312	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in soil microbiology and composting as the biological foundation of organic animal production		
GENERAL OBJECTIVE 1.0: Understand soil as a living system and the basic ecology of soil microorganisms.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define soil. 1.2 Describe the soil profile. 1.3 Describe soil texture and structure. 1.4 Explain soil microbiology. 1.5 Describe the abundance of soil organisms. 1.6 Describe factors affecting soil. microbial activity 1.7 Describe the soil food.	• Explain soil • Explain the soil profile • Explain soil texture (sand, silt, clay) and structure (granular, blocky, prismatic, platy). • Explain soil microbiology • Explain the abundance of soil organisms	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Examine a soil pit on the institutional farm; • Identify soil horizons and describe each. • Conduct soil-texture analysis using ribbon-feel test or jar test. • Collect soil samples from different sites (cropland, pasture, forest) for laboratory examinations. • Examine soil under	Guide students to; • Examine a soil pit on the institutional farm; • Identify soil horizons and describe each. • Conduct soil-texture analysis using ribbon-feel test or jar test. • Collect soil samples from different sites (cropland, pasture, forest) for laboratory examinations.	Soil pit at institutional farm. Spade, ruler, soil sieve. Microscope, slides, stains. Glass jars, lime water, CO_2 indicator. Sample bags, label pen, PPE.

	1.8 Describe nutrient cycling driven by microbes.	•Explain factors affecting soil microbial activity •Explain the soil food •Explain nutrient cycling driven by microbes		microscope; • Identify fungal hyphae, bacterial clumps, protozoa. • Use a soil-respiration test (CO_2 in jar method) to compare biological activity in different soils.	• Examine soil under microscope; • Identify fungal hyphae, bacterial clumps, protozoa. • Use a soil-respiration test (CO_2 in jar method) to compare biological activity in different soils.	
GENERAL OBJECTIVE 2.0: Know the classification of major groups of soil microorganisms						
2-3	2.1 Describe soil bacteria. 2.2 Describe actinomycetes. 2.3 Describe soil fungi. 2.4 Describe soil parasites. 2.5 Describe soil algae. 2.6 Describe soil viruses. 2.7 Describe soil fauna. 2.8 Describe nematodes. 2.9 Describe arbuscular mycorrhizal fungi (amf) and ectomycorrhiza.	• Explain soil bacteria • Explain actinomycetes • Explain soil fungi • Explain soil parasites • Explain soil algae • Explain soil viruses • Discuss soil fauna • Explain describe nematodes • Explain arbuscular mycorrhizal fungi (amf) and ectomycorrhiza	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Prepare wet mounts of soil suspension; • Examine for protozoa and small fauna. • Conduct serial dilution and culture soil bacteria on nutrient agar; • Count colonies. • Culture soil fungi on potato dextrose agar (PDA); • Identify Aspergillus, Trichoderma colonies. • Conduct Gram staining on isolated	Guide students to; • Prepare wet mounts of soil suspension; • Examine for protozoa and small fauna. • Conduct serial dilution and culture soil bacteria on nutrient agar; • Count colonies. • Culture soil fungi on potato dextrose agar (PDA); • Identify Aspergillus, Trichoderma colonies. • Conduct Gram	Microscope, slides, stains. Petri dishes, nutrient agar, PDA. Inoculating loop, sterilizer. Trypan blue, KOH, alcohol. Baermann funnel, beakers. Earthworm samples, forceps. PPE.

				bacterial colonies. • Examine earthworms collected from field. • Identify species (e.g. Eudrilus eugeniae). • Examine mycorrhiza-colonised roots under microscope (stained with trypan blue). • Conduct nematode extraction from soil (Baermann funnel method).	staining on isolated bacterial colonies. • Examine earthworms collected from field; • Identify species (e.g. Eudrilus eugeniae). • Examine mycorrhiza-colonised roots under microscope (stained with trypan blue). • Conduct nematode extraction from soil (Baermann funnel method).	
GENERAL OBJECTIVE 3.0: Understand soil-plant-microbe interactions.						
4	3.1 Define the rhizosphere. 3.2 Describe the rhizosphere effect (R:S ratio) . 3.3 Explain root exudates. 3.4 Describe the mycorrhizosphere. 3.5 Describe positive plant-microbe interactions. 3.6 Explain negative interactions.	• Explain rhizosphere. • Explain rhizosphere effect. • Explain root exudates. • Explain mycorrhizosphere. • Explain positive interactions. • Explain negative interactions. • Explain suppressive soils.	Charts of rhizosphere. Projector, whiteboard. Reference textbooks, internet.	• Carefully excavate plant roots; • Observe rhizosphere soil clinging to roots. • Plate dilutions from rhizosphere and bulk soil; • Compare microbial counts to demonstrate rhizosphere effect. • Examine excised legume roots; • Identify nodules.	Guide students to; • Carefully excavate plant roots; • Observe rhizosphere soil clinging to roots. • Plate dilutions from rhizosphere and bulk soil; • Compare microbial counts to demonstrate rhizosphere effect. • Examine excised legume roots;	Spade, gloves, sample bags. Petri dishes, dilutions. Microscope, slides. Legume plants, pot, soil. Compost, seedlings.

	3.7 Describe disease-suppressive soils. 3.8 Explain Plant Growth-Promoting Rhizobacteria (PGPR).	• Explain Plant Growth-Promoting Rhizobacteria (PGPR)		• Squeeze and observe pink leghaemoglobin. • Examine root tips microscopically for mycorrhizal colonisation. • Set up pot experiment: maize/beans/tomato seedlings with vs without compost inoculation; • Observe growth differences over weeks.	• Identify nodules. • Squeeze and observe pink leghaemoglobin. • Examine root tips microscopically for mycorrhizal colonisation. • Set up pot experiment: maize/beans/tomato seedlings with vs without compost inoculation; • Observe growth differences over weeks.	
GENERAL OBJECTIVE 4.0: Know biological Nitrogen fixation, Phosphorus solubilisation and mycorrhizal symbiosis in organic systems.						
5	4.1 Describe the global nitrogen cycle. 4.2 Explain biological nitrogen fixation (BNF). 4.3 Explain the symbiotic BNF. 4.4 Describe non-symbiotic BNF. 4.5 Explain phosphorus solubilization.	• Discuss the global nitrogen cycle • Explain biological nitrogen fixation (BNF) • Explain symbiotic BNF • Describe non-symbiotic BNF • Explain phosphorus solubilization	Charts of nitrogen cycle and BNF. Reference textbooks, Projector, whiteboard.	• Inoculate cowpea or soybean seeds with Rhizobium inoculant plant; • Observe nodulation after 3-4 weeks. • Compare nodulated vs uninoculated plants; • Count nodules; • Weigh plant biomass.	Guide students to; • Inoculate cowpea or soybean seeds with Rhizobium inoculant; plant; • Observe nodulation after 3-4 weeks. • Compare nodulated vs uninoculated plants; • Count nodules;	Cowpea/soybean seeds, Rhizobium inoculant. Pots, soil. Pikovskaya's agar, Petri dishes. Wet sieve, microscope. Field

	4.6 Describe mycorrhizal symbiosis. 4.7 Describe sulfur and potassium cycling and microbial roles. 4.8 Explain how organic farming maximizes these biological pathways.	• Explain mycorrhizal symbiosis • Explain sulfur and potassium cycling and microbial roles. • Explain how organic farming maximizes these biological pathways		• Conduct a phosphate-solubilisation test — inoculate Pikovskaya's agar with bacterial isolates; observe halos. • Examine AMF spores in soil (wet sieving and decanting). • Identify nitrogen-fixing legume species growing wild on the institutional farm.	• Weigh plant biomass. • Conduct a phosphate-solubilisation test — inoculate Pikovskaya's agar with bacterial isolates; observe halos. • Examine AMF spores in soil (wet sieving and decanting). • Identify nitrogen-fixing legume species growing wild on the institutional farm.	equipment, identification guides.
GENERAL OBJECTIVE 5.0: Know the principles of composting						
6-7	5.1 Define composting 5.2 Describe the composting process phases 5.3 Describe the key parameters 5.4 Explain C:N values of common materials 5.6 Describe weed-seed kill, antibiotic-resistance reduction, AMR mitigation	• Explain composting. • Explain the composting process phases • Explain the key parameters • Explain C:N values of common materials • Explain weed-seed kill, antibiotic-resistance reduction, AMR mitigation	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Calculate C:N ratio for a recipe of cattle manure + maize stover + green legume residues. • Adjust a recipe to achieve C:N 30:1 using on-hand materials. • Conduct moisture test on compost ingredients (squeeze	Guide students to; • Calculate C:N ratio for a recipe of cattle manure + maize stover + green legume residues. • Adjust a recipe to achieve C:N 30:1 using on-hand materials. • Conduct moisture test on compost	Cattle manure, crop residues, legumes. Calculator, C:N table. Compost thermometer. Spade, fork, water source. Recording sheets, PPE.

	through composting. 5.7 Describe odour management	through composting. • Explain odour management.		test). • Construct a small compost pile (1 m³) on the institutional farm; record dimensions. • Monitor temperature daily for 4 weeks using compost thermometer. • Turn the pile at appropriate intervals; • Observe phases.	ingredients (squeeze test). • Construct a small compost pile (1 m³) on the institutional farm; record dimensions. • Monitor temperature daily for 4 weeks using compost thermometer. • Turn the pile at appropriate intervals; • Observe phases.	
GENERAL OBJECTIVE 6.0: Know composting methods.						
8-9	6.1 Describe windrow composting 6.2 Explain static-pile composting 6.3 Explain in-vessel composting 6.4 Describe vermicomposting 6.5 Describe sheet composting (mulching) 6.6 Explain bokashi. 6.7 Describe manure composting	• Explain windrow composting • Explain static-pile composting • Explain in-vessel composting • Explain vermicomposting • Explain sheet composting (mulching) • Discuss bokashi. • Discuss manure composting	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Construct a vermicomposting bin (1 m²); • Introduce earthworms (Eudrilus eugeniae from local source); • Add bedding and feed. • Monitor vermicomposting bin weekly. • Record worm activity, moisture, temperature, food added.	Guide students to; • Construct a vermicomposting bin (1 m²); • Introduce earthworms (Eudrilus eugeniae from local source); • Add bedding and feed. • Monitor vermicomposting bin weekly. • Record worm activity, moisture, temperature,	Vermicomposting bin, earthworms. Bokashi bran (EM), food waste. Sample composts, comparison sheet. Sheet composting materials. Carcass-

	6.8 Explain composting of livestock carcasses 6.9 Describe selection of method by scale, materials and resources.	• Explain composting of livestock carcasses • Explain selection of method by scale, materials and resources.		• Set up a bokashi bin using EM concentrate and food waste; ferment 2 weeks; bury in soil; observe. • Compare composts from different methods (windrow, vermicompost, bokashi) for appearance, smell, texture. • Implement sheet composting under selected forage crops; evaluate after 4-6 weeks. • Demonstrate carcass composting (or via diagram) for a deceased chicken/rabbit with biosecurity.	food added. • Set up a bokashi bin using EM concentrate and food waste; ferment 2 weeks; bury in soil; observe. • Compare composts from different methods (windrow, vermicompost, bokashi) for appearance, smell, texture. • Implement sheet composting under selected forage crops; evaluate after 4-6 weeks. • Demonstrate carcass composting (or via diagram) for a deceased chicken/rabbit with biosecurity.	composting materials. PPE.
GENERAL OBJECTIVE 7.0: Know compost quality assessment, application rates and timing in organic livestock production.						
10-11	7.1 Explain compost-maturity indicators	• Discuss compost-maturity indicators	Journals Charts	• Conduct a cress-seed bioassay on three	• Conduct a cress-seed bioassay on three	Cress seeds, Petri dishes,

	7.2 Describe compost quality tests 7.3 Explain compost nutrient content 7.4 Explain compost application rates 7.5 Explain application timing 7.6 Describe application methods 7.7 Explain compost teas. 7.8 Explain storage of finished compost. 7.9 Describe compost economics 7.10 Describe regulatory considerations	• Explain compost quality tests • Explain compost nutrient content • Explain compost application rates • Explain application timing. • Explain application methods. • Explain compost teas. • Explain storage of finished compost. • Explain compost economics.	Projector, whiteboard Marker. Textbooks Internet	compost samples to assess phytotoxicity. • Measure pH, EC, moisture and visual maturity of compost samples. • Calculate compost application rates for an organic vegetable plot • Prepare aerated compost tea on a sample plot. • Apply aerated compost tea on a sample plot. • Apply compost in the field using both broadcast and banding methods. • Conduct economic analysis of on-farm composting vs synthetic-fertiliser purchase.	compost samples to assess phytotoxicity. Guide students to; • Measure pH, EC, moisture and visual maturity of compost samples. • Calculate compost application rates for an organic vegetable plot • Prepare and apply aerated compost tea on a sample plot. • Apply compost in the field using both broadcast and banding methods. • Conduct economic analysis of on-farm composting vs synthetic-fertiliser purchase.	compost. pH and EC meters. Calculator, NPK analysis. Compost-tea aerator, bucket. Field plots, spreader. Economic analysis worksheet.
GENERAL OBJECTIVE 8.0: Know bio-fertilizers and bio-inoculants						
12-13	8.1 Define bio-fertilizer 8.2 Explain Rhizobium inoculants 8.3 Explain azotobacter	• Explain bio-fertilizer. • Discuss Rhizobium. • Explain Azotobacter. • Explain	Journals Charts Projector, whiteboard	• Apply Rhizobium inoculant to legume seeds; plant. • Compare with	Guide students to; • Apply Rhizobium inoculant to legume seeds; plant;	Rhizobium inoculant, seeds. Azolla, water

	inoculants 8.4 Describe Azospirillum inoculants 8.5 Describe Blue-Green Algae (Cyanobacteria) for rice paddies 8.6 Explain Azolla-Anabaena symbiosis 8.7 Explain Phosphate-Solubilising bacteria (PSB) and fungi (PSF) 8.8 Describe Mycorrhizal inoculants 8.9 Explain Trichoderma. 8.10 Explain Potassium-Mobilising bacteria. 8.11 Describe Liquid Bio-Fertilisers 8.12 Describe Nigerian biofertilizer producers	Azospirillum. • Explain cyanobacteria. • Explain Azolla-Anabaena. • Explain PSB and PSF. • Explain mycorrhizal inoculants. • Explain Trichoderma. • Explain K-mobilising bacteria. • Explain liquid biofertilisers. • Explain Nigerian biofertilizer producers,	Marker. Textbooks Internet	uninoculated control over 6 weeks. • Examine Azolla in water containers. • Observe growth and nitrogen fixation. • Apply Trichoderma to plant cuttings as biocontrol against damping-off and compare survival. • Set up multi-treatment pot trial: control vs Rhizobium vs Azotobacter vs mycorrhiza vs combined. • Prepare liquid biofertilizer using molasses, EM and farm waste. • Visit a biofertilizer production facility or distributor.	• Compare with uninoculated control over 6 weeks. • Examine Azolla in water containers; • Observe growth and nitrogen fixation. • Apply Trichoderma to plant cuttings as biocontrol against damping-off and compare survival. • Set up multi-treatment pot trial: control vs Rhizobium vs Azotobacter vs mycorrhiza vs combined. • Prepare liquid biofertilizer using molasses, EM and farm waste. • Visit a biofertilizer production facility or distributor.	containers. Trichoderma, plant cuttings. Multiple inoculants, pots. Molasses, EM, brewer bucket. Transport for visit.
GENERAL OBJECTIVE 9.0: Know soil-health monitoring methods.						
14-15	9.1 Describe the concept of soil health	• Explain soil health concept.	Journals Charts	• Conduct a comprehensive soil-	Guide students to; • Conduct a	Cornell Soil Health field

	9.2 Describe Physical indicators 9.3 Describe Chemical indicators 9.4 Describe Biological indicators 9.5 Describe integrated soil-health scoring 9.6 Describe soil-health monitoring on-farm 9.7 Describe soil-health restoration 9.8 Describe Nigerian soil-fertility status and the Africa Soil Information Service (AFSIS) maps. 9.9 Describe digital tools for soil monitoring 9.10 Describe entrepreneurial opportunities	• Discuss physical indicators. • Explain chemical indicators. • Discuss biological indicators. • Explain integrated soil-health scoring. • Discuss on-farm monitoring. • Explain erestoration practices. • Explain Nigerian soils. • Discuss digital tools. • Explain entrepreneurship.	Projector, Whiteboard Marker. Textbooks Internet	health assessment on the institutional farm using Cornell Soil Health field card. • Measure and compare infiltration rates (single-ring infiltrometer) at 3 sites • Compare infiltration rates (single-ring infiltrometer) at 3 sites • Conduct slake test on aggregates from 3 soil samples; • Observe aggregate stability. • Measure earthworm count and types in a 30 cm × 30 cm × 20 cm soil block. • Examine soil-microbial respiration using Solvita CO_2 test (or jar method) on 3 samples. • Develop a soil-health monitoring plan for the institutional farm: baseline + 5-year	comprehensive soil-health assessment on the institutional farm using Cornell Soil Health field card. • Measure and compare infiltration rates (single-ring infiltrometer) at 3 sites • Conduct slake test on aggregates from 3 soil samples; • Observe aggregate stability. • Measure earthworm count and types in a 30 cm × 30 cm × 20 cm soil block. • Examine soil-microbial respiration using Solvita CO_2 test (or jar method) on 3 samples. • Develop a soil-health monitoring plan for the institutional farm: baseline + 5-year follow-up. • Develop a business	card. Infiltrometer (or DIY ring). Slake-test jars. Sample container, ruler. Solvita kit (or jar method). Monitoring plan template. Business plan template.

				follow-up. • Develop a business plan for an on-farm soil testing and composting service.	plan for an on-farm soil testing and composting service.	
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

ORGANIC PASTURE AND FORAGE PRODUCTION

<table>
<tr><td colspan="3">PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY</td></tr>
<tr><td rowspan="2">COURSE TITLE: ORGANIC PASTURE AND FORAGE PRODUCTION</td><td>COURSE CODE: OAP 313</td><td>CONTACT HOURS: 4 HOURS/WEEK</td></tr>
<tr><td>CREDIT UNIT: 4</td><td>THEORETICAL: 1 HOUR/WEEK</td></tr>
<tr><td>YEAR: I SEMESTER: I</td><td>PRE-REQUISITE: NIL</td><td>PRACTICAL: 3 HOURS/WEEK</td></tr>
<tr><td colspan="3">GOAL: This course is designed to equip students with knowledge and skills of producing organic pasture and forage for livestock.</td></tr>
<tr><td colspan="3">GENERAL OBJECTIVES: On completion of this course, the students should be able to:
1.0 Understand principles of organic pasture and forage production;
2.0 Know major tropical grasses suitable for Nigerian organic pastures;
3.0 Know tropical leguminous forages;
4.0 Know organic pastures and forage plots without synthetic inputs;
5.0 Know pasture management practices;
6.0 Know soil-pasture-animal nutrient cycling principles in organic systems;
7.0 Know Organic forage conservation;
8.0 Know crop residues and agro-industrial by-products;
9.0 Know forages with crop and tree systems.</td></tr>
</table>

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION		
COURSE TITLE: ORGANIC PASTURE AND FORAGE PRODUCTION	COURSE CODE: OAP 313	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills of producing organic pasture and forage for livestock.		
GENERAL OBJECTIVE 1.0: Understand principles of organic pasture and forage production.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define i. Pasture ii. Forage iii. Fodder iv. Browse v. Range vi. Biomass vii. Bio-threat viii. Paddock. 1.2 Explain the importance of forage in organic livestock production	• Explain pasture forage, fodder, browse, range, biomass paddock. • Explain the importance of forage in organic livestock production • Explain IFOAM standards for forage • Discuss Nigerian agro-ecological zones • Explain classification of forages	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Tour the institution pasture and forage plots. • Identify species present and their growth stages. • Identify the agro-ecological zone of the institution • Identify 10 suitable forage species. • Conduct forage	Guide students to; • Tour the institution pasture and forage plots. • Identify species present and their growth stages. • Identify the agro-ecological zone of the institution. • Identify 10 suitable forage species.	Institutional pasture. Identification guides. Clippers, scale, drying oven. CP/fibre lab kit. Compliance checklist. PPE.

	1.3 Explain IFOAM standards for forage 1.4 Explain Nigerian agro-ecological zones 1.5 Describe classification of forages 1.6 Explain forage growth stages 1.7 Describe forage quality parameters 1.8 Describe Nigerian forage seed and seedling sources	• Explain forage growth stages • Explain forage quality parameters • Explain Nigerian forage seed and seedling sources		clipping at fixed cuts to assess yield per area. • Estimate dry matter. • Examine forage quality (CP, fibre) on sample forage cuts using laboratory methods or quick visual assessment.	• Conduct forage clipping at fixed cuts to assess yield per area. • Estimate dry matter. • Examine forage quality (CP, fibre) on sample forage cuts using laboratory methods or quick visual assessment.	
GENERAL OBJECTIVE 2.0: Understand major tropical grasses suitable for Nigerian organic pastures						
2-3	3.1 Describe Andropogon Gayanus (Gamba grass. 3.2 Describe Cynodon spp. 3.3 Describe Brachiaria spp. 3.4 Describe Panicum Maximum (Guinea grass) 3.5 Describe	• Explain Andropogon Gayanus (Gamba grass. • Explain Cynodon spp. (Bermuda grass, Coast grass, Star grass) • Explain Brachiaria spp. (Signal grass: B. Decumbens, B. Ruziziensis, B. Brizantha, B. Mutica. • Explain Panicum Maximum.	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Identify the 10 major grass species using fresh specimens and seed. • Establish a grass propagation nursery — sow seed of 3 species and plant cuttings/slips of 3 species. • Monitor establishment over 4-	Guide students to; • Identify the 10 major grass species using fresh specimens and seed. • Establish a grass propagation nursery — sow seed of 3 species and plant cuttings/slips of 3 species. • Monitor	Grass specimens, seed lots. Nursery beds, watering can. Hand tools, identification guides. Pasture area for establishment

	Pennisetum spp 3.6 Describe Chloris Gayana (Rhodes grass) 3.7 Describe Cenchrus Ciliaris (Buffel grass) 3.8 Describe Digitaria spp 3.9 Describe Napier spp 3.10 Describe other grasses 3.11 Describe Seed and Vegetative propagation; 3.12 Describe seed rate, sowing depth, sowing time for major species.	• Explain Pennisetum spp. • Explain Chloris Gayana (Rhodes grass) • Discuss Cenchrus Ciliaris (Buffel grass) • Explain Digitaria spp • Explain Napier spp • Explain other grasses		6 weeks; • Record germination rate, vigour, growth. • Restore degraded/over-sown pasture with improved grass species. • Identify reproductive structures of 5 grass species (panicle, raceme, spike). • Conduct seed test for purity, germination percentage on stored seed.	establishment over 4-6 weeks; • Record germination rate, vigour, growth. • Restore degraded/over-sown pasture with improved grass species. • Identify and sketch reproductive structures of 5 grass species (panicle, raceme, spike). • Conduct seed test for purity, germination percentage on stored seed.	/ restoration. Sketch paper. Petri dishes, germination paper.
GENERAL OBJECTIVE 3.0: Understand tropical leguminous forages						
4-5	3.1 Describe the importance of legumes in organic forage systems 3.2 Describe Centrosema spp	• Explain the importance of legumes in organic forage systems • Explain Centrosema spp. (C. pubescens, C. brasilianum)	Journals Charts Projector, whiteboard Marker. Textbooks	• Identify the major leguminous forage species using fresh specimens and seed. • Conduct seed scarification on hard-	Guide students to; • Identify the major leguminous forage species using fresh specimens and seed. • Conduct seed	Legume specimens, seed. Scarification tools. Rhizobium

	3.3 Describe Stylosanthes spp. 3.4 Describe Lablab Purpureus (hyacinth bean, dolichos etc). 3.5 Describe Mucuna pruriens (velvet bean). 3.6 Describe Pueraria Phaseoloides (tropical kudzu). 3.7 Describe Desmodium spp. 3.8 Describe Browse Leguminous Trees 3.9 Describe Leucaena 3.10 Describe Gliricidia 3.11 Describe Calliandra 3.12 Describe Faidherbia (Acacia albida) 3.13 Describe seed scarification 3.14 Describe inoculation of legume seeds with Rhizobium	• Explain Stylosanthes spp. (S. guianensis, S. hamata, S. scabra. • Explain Lablab Purpureus (hyacinth bean, dolichos) • Explain Mucuna Pruriens (velvet bean). • Explain Pueraria Phaseoloides (tropical kudzu). • Explain Desmodium spp. • Explain Browse Leguminous Trees • Explain Leucaena management. • Explain Gliricidia • Explain Calliandra • Explain Faidherbia (Acacia albida) • Explain seed scarification • Explain inoculation of legume seeds with Rhizobium	Internet	coated legume seeds (e.g. Mucuna, Leucaena). • Inoculate legume seeds with Rhizobium; sow in nursery beds. • Establish browse hedge of Leucaena/Gliricidia/Calliandra — plant stick cuttings or seedlings 0.5 m apart. • Monitor and manage browse hedge; first coppice at 6 months. • Conduct mixed grass-legume sowing (e.g. Andropogon + Stylo) • Observe interaction. • Examine root nodulation on field-grown legumes.	scarification on hard-coated legume seeds (e.g. Mucuna, Leucaena). • Inoculate legume seeds with Rhizobium; sow in nursery beds. • Establish browse hedge of Leucaena/Gliricidia/Calliandra — plant stick cuttings or seedlings 0.5 m apart. • Monitor and manage browse hedge; first coppice at 6 months. • Conduct mixed grass-legume sowing (e.g. Andropogon + Stylo) • Observe interaction. • Examine root nodulation on field-grown legumes.	inoculant. Browse cuttings, planting tools. Pruning saw, secateurs. Mixed-sowing plots. Spade for root examination.

GENERAL OBJECTIVE 4.0: Know organic pastures and forage plots without synthetic inputs.						
6	4.1 Describe site selection 4.2 Describe land preparation organically 4.3 Describe soil fertility preparation organically 4.4 Describe pasture seed mixtures. 4.5 Describe seeding methods 4.6 Describe time of sowing 4.7 Describe seed rate 4.8 Describe weed management organically. 4.9 Describe protection from livestock during establishment 4.10 Describe first cutting/grazing 4.11 Describe replanting and gap-filling.	• Explain site selection • Explain land preparation organically — hand clearing, slashing, controlled burning (limited), animal traction, minimum tillage. • Explain soil fertility preparation organically — compost, manure, biofertilizers, green manure (cover crop). • Explain pasture seed mixtures — grass + legume combinations (50:50 or 60:40); native + improved species. Describe seeding methods — broadcast, drilling, oversowing into existing sod. • Explain time of sowing — onset of rainy season; soil moisture critical. • Explain seed rate, sowing depth (1–2 cm	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Prepare a 100 m² plot organically — clear, till lightly, apply compost (5 t/ha equivalent), broadcast a grass-legume seed mixture. • Cover seed by light raking; mulch lightly; water if rain delayed. • Monitor establishment weekly for 8 weeks; • Record germination, weed pressure, growth. • Conduct manual weeding at appropriate intervals. • Design a 1-ha organic pasture for 20 sheep, including species selection and management plan. • Conduct first cut/grazing at appropriate height • Measure yield.	Guide students to; • Prepare a 100 m² plot organically — clear, till lightly, apply compost (5 t/ha equivalent), broadcast a grass-legume seed mixture. • Cover seed by light raking; mulch lightly; water if rain delayed. • Monitor establishment weekly for 8 weeks; • Record germination, weed pressure, growth. • Conduct manual weeding at appropriate intervals. • Design a 1-ha organic pasture for 20 sheep, including species selection and management plan. • Conduct first cut/grazing at appropriate height • Measure yield.	Plot area, hand tools. Compost, seed mixture. Mulch material, water source. Recording sheets. Pasture design template. Yield measurement tools.

		for small seeds, 3–5 cm for larger). • Explain weed management organically — mechanical (slashing, mowing), animal grazing, mulching, NO synthetic herbicides. • Explain protection from livestock during establishment — fencing for 60–90 days. • Explain first cutting/grazing — after ≥ 80 % cover and seed-set; do not graze below 5–10 cm residual height. • Explain replanting and gap-filling.				
GENERAL OBJECTIVE 5.0: Know pasture management practices						
7-8	5.1 Explain carrying capacity. 5.2 Explain stocking rate (SR) 5.3 Explain livestock units 5.4 Explain continuous grazing	• Explain carrying capacity (CC) • Explain stocking rate (SR). • Explain livestock units • Explain continuous grazing. • Explain Rotational	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Compute carrying capacity for a sample pasture: yield (kg DM/ha) and animal DM intake. • Design a rotational grazing system for a	Guide students to: • Compute carrying capacity. • Design rotational system. • Implement rotation. • Measure sward height.	Calculator, pasture data. Movable electric fence, energiser. Sward stick or rising

	5.5 Explain Rotational Grazing 5.6 Explain Deferred Grazing 5.7 Describe Mob Grazing (high-density short-duration) 5.8 Explain Strip Grazing 5.9 Describe Tether Grazing 5.10 Explain Leader-Follower Grazing. 5.11 Describe pasture rest periods 5.12 Describe water provision and shade in pastures. 5.13 Explain pasture-parasite management organically 5.14 Explain pasture monitoring 5.15 Explain alley pasture farming	Grazing • Explain Deferred Grazing — closing portions of pasture during wet season for dry-season use. • Explain Mob Grazing (high-density short-duration) • Explain Strip Grazing — movable fencing; limited daily allocation; suitable for dairy. • Explain Tether Grazing — individual animals tied; suitable for smallholders. • Explain Leader-Follower Grazing • Explain pasture rest periods • Explain water provision and shade in pastures. • Explain pasture-parasite management organically • Explain pasture monitoring • Explain alley pasture		5-ha pasture with 30 goats: number of paddocks, rest period, daily allocation. • Implement rotational grazing using movable electric fence on a small herd (or simulation). • Measure sward height at 5 points using sward stick; record before and after grazing. • Conduct botanical composition assessment — step-point method. • Map a pasture into paddocks with appropriate water and shade provision. • Develop a 12-month grazing plan for a Nigerian organic dairy farm.	• Conduct botanical composition. • Map pasture paddocks. • Develop grazing plan.	plate. Botanical composition framework. Mapping paper, markers. Grazing plan template.

		farming				
GENERAL OBJECTIVE 6.0: Know soil-pasture-animal nutrient cycling principles in organic systems.						
9	6.1 Describe nutrient cycling on pasture 6.2 Explain distribution of nutrients in dung and urine. 6.3 Explain management to improve nutrient distribution 6.4 Describe nutrient export through milk, meat, wool 6.5 Describe nitrogen flow 6.6 Explain phosphorus flow. 6.7 Explain potassium and other nutrients. 6.8 Describe greenhouse-gas emissions from pasture 6.9 Explain carbon sequestration in pasture system. 6.10 Explain organic pasture as climate-	• Explain nutrient cycling on pasture — plant uptake, animal intake, excretion (urine, dung), microbial decomposition, plant re-uptake. • Explain distribution of nutrients in dung and urine. • Explain management to improve nutrient distribution • Explain nutrient export through milk, meat, wool • Discuss nitrogen flow • Explain phosphorus flow • Explain potassium and other nutrients. • Discuss greenhouse-gas emissions from pasture (denitrification of dung-N). • Explain carbon	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Examine dung distribution on a pasture • Map patches and bare areas. • Calculate nutrient balance — inputs (BNF, deposition, manure imported) vs outputs (milk, meat, leaching). • Examine soil under dung patches vs bare areas • Observe microbial activity, plant growth. • Conduct soil sampling at multiple paddock points; • Assess nutrient variability. • Design a grazing strategy to optimise nutrient	Guide students to; • Examine dung distribution on a pasture; map patches and bare areas. • Calculate nutrient balance — inputs (BNF, deposition, manure imported) vs outputs (milk, meat, leaching). • Examine soil under dung patches vs bare areas • Observe microbial activity, plant growth. • Conduct soil sampling at multiple paddock points; • Assess nutrient variability. • Design a grazing strategy to	Field equipment, GPS or measuring tape. Nutrient balance worksheet. Soil-test kit. Soil augers. Strategy template.

	smart agriculture.	sequestration in pasture systems • Explain organic pasture as climate-smart agriculture.		distribution.	optimise nutrient distribution.	
GENERAL OBJECTIVE 7.0: Know organic forage conservation						
10	7.1 Explain forage conservation 7.2 Describe Hay-Making. 7.3 Explain hay quality factors 7.4 Explain hay-making equipment • Mower • Tedder • Rake • baler • Explain Silage-Making 7.6 Explain silage moisture 7.7 Explain silage additives 7.8 Describe silage storage i. Bunker Silo ii. Tower Silo	• Explain forage conservation storing excess wet-season forage for dry-season use. • Explain Hay-Making — cut grass; field-dry to 15–18 % moisture; bale; store. • Explain hay quality factors ✓ cutting at right stage (vegetative-boot) ✓ rapid drying, ✓ protection from rain. • Explain hay-making equipment ✓ Mower ✓ tedder, ✓ rake, baler. • Explain Silage-Making — chop forage; pack	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Cut, dry and bale hay from cut grass on the institutional farm; • Assess moisture before baling. • Make small bunker silo: chop grass + molasses + salt; pack tightly. • Make plastic-bag silage (25 kg bag); seal; open after 3-4 weeks. • Make haylage: wilt grass to 40–50 % moisture; pack; seal in plastic. • Assess silage and hay quality: pH (silage 4.0–4.5), aroma, colour,	Guide students to; • Cut, dry and bale hay from cut grass on the institutional farm; • Assess moisture before baling. • Make small bunker silo: chop grass + molasses + salt; pack tightly; seal; open after 4 weeks. • Make plastic-bag silage (25 kg bag); seal; open after 3-4 weeks. • Make haylage: wilt grass to 40–50 % moisture; pack; seal in plastic. • Assess silage and hay quality: pH	Mowing tools, balers, hay shed. Chopper, molasses, salt. Plastic silage bags. Wilting area, plastic. pH meter, moisture meter. Test animals, recording sheets. Economic worksheet.

	iii. Plastic Bag Silo iv. Ground Pit 7.9 Explain Haylage 7.10 Explain stover 7.11 Explain organic compliance 7.12 Explain quality assessment 7.13 Explain spoilage and aflatoxin risk in poorly stored forage.	tightly; seal anaerobically; lactic-acid fermentation; preserved at low pH. • Explain silage moisture (target 60–70 %); cut at right maturity. • Explain silage additives — molasses (5–10 %); salt; effective microorganisms; allowed organic inoculants. • Explain silage storage — bunker silo, tower silo, plastic bag silo, ground pit; importance of seal. • Explain Haylage — wilted to 40–50 % moisture; sealed in plastic; intermediate between hay and silage. • Explain stover ✓ corn stover, ✓ sorghum stover) ✓ conservation standing or harvested. • Explain organic compliance — IFOAM-		moisture, mould absence. • Feed conserved forage to a sample group of animals; assess intake. • Compute economics of forage conservation vs purchase.	(silage 4.0–4.5), aroma, colour, moisture, mould absence. • Feed conserved forage to a sample group of animals; assess intake. • Compute economics of forage conservation vs purchase.	

		permitted preservatives only (no synthetic acids beyond molasses, salt). • Explain quality assessment pH, smell.				
GENERAL OBJECTIVE 8.0: Know crop residues and agro-industrial by-products						
11-12	8.1 Describe importance of crop residues and by-products in Nigerian organic feeding 8.2 Describe Cereal Residues 8.3 Describe Legume Residues 8.4 Describe fermentation of crop residues 8.5 Describe storage of residues. 8.6 Describe smallholder fodder banks and crop-residue management. 8.7 Describe value chain of organic agro-industrial by-products in Nigeria	• Explain importance of crop residues and by-products in Nigerian organic feeding • Explain Cereal Residues — maize stover, sorghum stover, rice straw, millet stover, wheat straw; characteristics (high fibre, low protein); processing. • Explain Legume Residues — groundnut haulm, soybean haulm, • Explain importance of crop residues and by-products in Nigerian organic feeding • Explain Cereal Residues — maize stover, sorghum stover,	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Conduct Visit to Nigerian feed mill, brewery, or oil-palm mill to observe by-product flow. • Chop maize stover and palm-kernel cake. • Mix and feed to ruminants; • Observe acceptance. • Conduct urea treatment of straw (if compliant with chosen organic standard): 4 % urea + moisture; 21 days. • Make a crop-residue silage with cassava peel + molasses + palm-kernel cake. • Examine sample	Guide students to; • Conduct Visit to Nigerian feed mill, brewery, or oil-palm mill to observe by-product flow. • Chop maize stover and palm-kernel cake. • Mix and feed to ruminants; • Observe acceptance. • Conduct urea treatment of straw (if compliant with chosen organic standard): 4 % urea + moisture; 21 days. • Make a crop-residue silage with cassava peel + molasses + palm-kernel cake.	Transport for visit. Chopper, by-products, test animals. Urea, water, plastic sheet. Cassava peel, organic PKC. Lab equipment. Formulation worksheet. Economic worksheet.

		rice straw, millet stover, wheat straw; characteristics (high fibre, low protein); processing. • Explain Legume Residues — groundnut haulm, soybean haulm,. • Explain fermentation of crop residues • Explain storage of residues. • Explain smallholder fodder banks and crop-residue management. • Explain value chain of organic agro-industrial by-products in Nigeria		agro-industrial by-products for nutritional content using lab methods. • Develop a feed-formulation that maximises use of locally available residues and by-products. • Conduct economic analysis of by-product feeding vs grain feeding.	• Examine sample agro-industrial by-products for nutritional content using lab methods. • Develop a feed-formulation that maximises use of locally available residues and by-products. • Conduct economic analysis of by-product feeding vs grain feeding.	
GENERAL OBJECTIVE 9.0: Know forages with crop and tree systems						
13-15	9.1 Define agroforestry 9.2 Describe types of agroforestry 9.3 Describe Alley Farming 9.4 Describe Silvopasture 9.5 Describe Agro-silvopastoralism	• Explain agroforestry — integration of trees with crops and/or livestock. • Explain types of agroforestry • Explain Alley Farming • Explain Silvopasture — trees + pasture + livestock; benefits	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Visit a Nigerian agroforestry farm or silvopastoral system. • Establish a small alley-cropping plot with Leucaena or Gliricidia + maize/cowpea. • Plant leguminous	Guide students to; • Visit a Nigerian agroforestry farm or silvopastoral system. • Establish a small alley-cropping plot with Leucaena or Gliricidia + maize/cowpea.	Transport for visit. Browse seedlings/cuttings. Plot area, tools. Pruning saw, measuring

	9.6 Describe Parkland 9.7 Describe Fodder Banks 9.8 Describe Multi-Purpose Trees (Mpts). 9.9 Describe Scattered Trees In Pasture 9.10 Describe Silvo-Foraging 9.11 Describe management considerations 9.12 Describe Fallow Improvement 9.13 Describe Cover Crops in livestock systems 9.14 Describe Nigerian agroforestry initiatives and enterpreneurship	(shade, fodder, nitrogen-fixation, soil, microclimate). • Explain agrosilvopastoral — trees + crops + livestock; common in Nigerian smallholder systems. • Explain Parkland — scattered trees (Faidherbia, shea, baobab) over crops/pasture. • Explain Fodder Banks • Explain Multi-Purpose Trees (MPTs) • Explain Scattered Trees In Pasture — retain selected trees during pasture establishment; coppicing. • Explain SILVO-FORAGING — mature trees with understory forage. • Explain management considerations • Explain Fallow		trees for silvopasture; spacing 4 × 4 m or 6 × 6 m. • Conduct coppicing of established browse trees; measure regrowth. • Establish a 2-ha agroforestry organic livestock system for guinea savanna conditions. • Develop a business plan for a fodder-tree nursery enterprise. • Present integrated organic pasture-forage management for Nigerian smallholder farms.	• Plant leguminous trees for silvopasture; spacing 4 × 4 m or 6 × 6 m. • Conduct coppicing of established browse trees; measure regrowth. • Design and establish a 2-ha agroforestry organic livestock system for guinea savanna conditions. • Develop a business plan for a fodder-tree nursery enterprise. • Present integrated organic pasture-forage management for Nigerian smallholder farms.	tape. Agroforestry design template. Business plan template. Projector, presentation board.

		Improvement • Explain COVER CROPS in livestock • Explain Nigerian agroforestry initiatives				

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

CLIMATE-SMART FARM MECHANIZATION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: CLIMATE-SMART FARM MECHANIZATION	COURSE CODE: OAP 314	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in climate-smart farm mechanization for organic livestock systems		

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

1.0 Understand the principles of climate-smart agriculture and relevant scale of mechanization for organic systems;
2.0 Know renewable energy sources;
3.0 Know animal-powered traction;
4.0 Operate small-scale tractors, two-wheel tractors and relevant-scale field equipment;
5.0 Operate low-energy forage and fodder machinery;
6.0 Operate feed-processing equipment suitable for organic feed;
7.0 Know construction and maintenance of manual and semi-automated livestock housing;
8.0 Know manure-handling, composting, vermicomposting and biogas-generation equipment;
9.0 Know the principles in climate-smart mechanization.

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION		
COURSE TITLE: CLIMATE-SMART FARM MECHANIZATION	COURSE CODE: OAP 314	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in climate-smart farm mechanization for organic livestock systems		
GENERAL OBJECTIVE 1.0: Understand the principles of climate-smart agriculture and relevant-scale mechanization for organic systems.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define climate-smart agriculture (CSA) per FAO 1.2 Describe the three pillars of CSA 1.3 Define appropriate technology 1.4 Describe energy sources for mechanization 1.5 Explain GHG	• Explain climate-smart agriculture (CSA) per FAO • Explain the three pillars of CSA • Explain appropriate technology (Schumacher • Explain energy sources for mechanization • Explain GHG emissions in farm mechanization	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Assess the institutional farm's current mechanization profile • Calculate carbon footprint of current vs proposed CSA mechanization for the farm. • Identify climate-	Guide students to; • Assess the institutional farm's current mechanization profile • Calculate carbon footprint of current vs proposed CSA mechanization for	Institutional farm and workshop. Mechanization inventory sheet. Carbon footprint calculator/template. Reference figures.

	emissions in farm mechanization 1.6 Explain energy efficiency 1.7 Describe IFOAM and NOAN compliance 1.8 Explain the Nigerian energy context	• Explain energy efficiency • Explain IFOAM and NOAN compliance • Explain Nigerian context — power supply challenges, fuel cost volatility, small-farm scale, climate vulnerability		smart vs conventional equipment. • Identify mechanization needs of a 2-ha organic livestock farm.	the farm. • Identify climate-smart vs conventional equipment. • Identify mechanization needs of a 2-ha organic livestock farm.	
GENERAL OBJECTIVE 2.0: Know renewable energy sources						
2-3	2.1 Describe solar photovoltaic (PV) 2.2 Explain applications of solar PV on farm 2.3 Describe solar thermal 2.4 Explain BIOGAS residues 2.5 Explain biogas digesters 2.6 Describe biogas uses 2.7 Describe efficient cookstoves 2.8 Describe Wind Energy 2.9 Describe Micro-	• Discuss solar photovoltaic (PV) systems — panels, charge controller, inverter, batteries; sizing for farm needs. • Explain applications of solar PV on farm — water pumping, lighting, electric fencing, Explain biomass. • Explain efficient cookstoves. • Explain wind energy. • Explain micro-hydro. • Explain energy	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Install a small (50–100 W) solar PV system to power a poultry brooder light or fan. • Measure solar irradiance using a pyranometer or proxy method. • Construct a small biogas digester (5–10 m³ plastic-bag type) using cattle manure. • Monitor biogas production over 30 days;	Guide students to: • Install solar system. • Measure irradiance. • Construct biogas digester. • Monitor biogas. • Construct cookstove. • Calculate payback. • Design renewable system.	Solar panels, controller, battery. Pyranometer or app. Biogas materials, manure. Gas measuring equipment. Cookstove materials. Calculator, economic worksheet. Design

	Hydro 2.10 Describe energy economics comparison with grid and diesel. 2.11 Explain Nigerian renewable energy programmes	economics. • Explain Nigerian programmes.		• Measure gas volume and pH. • Construct an improved cookstove (rocket stove) from locally available materials. • Calculate payback period for a 1 kWp solar system replacing kerosene lamps and diesel generator. • Design a renewable-energy system for a 50 lactating cow in an organic dairy farm.		template.
GENERAL OBJECTIVE 3.0: Know animal-powered traction						
4	3.1 Explain history and current relevance of animal traction in Nigeria. 3.2 Explain Draught Animals 3.3 Describe Animal Selection— age (3–10 years), body	• Explain history and relevance. • Explain draught animals. • Explain animal selection. • Explain training. • Explain harnessing. • Explain animal-drawn	Charts of animal traction. Projector, whiteboard. Reference textbooks.	• Visit a Nigerian draught-animal farm or animal-traction unit. • Harness an ox or donkey; • Demonstrate yoke fitting and removal. • Operate animal-	Guide students to; • Visit a Nigerian draught-animal farm or animal-traction unit. • Harness an ox or donkey; • Demonstrate yoke fitting and	Transport for visit. Draught animals, harness, yoke. Plough, plot area. Welfare checklist.

	condition, temperament, training. 3.4 Explain Training 3.5 Describe Harnessing. 3.6 Explain Animal-Drawn Implements 3.7 Describe Working Schedule — 3.8 Describe Nutrition Draught Animals 3.9 Explain Economics of Draught 3.10 Explain organic compatibility. 3.11 Describe Nigerian institutions	implements. • Explain working schedule. • Explain nutrition. • Explain economics. • Explain organic compatibility. • Explain institutions NAERLS, NAPRI, NCAM Ilorin, ARCN training in animal traction.		drawn plough on a small plot • Conduct health and welfare assessment of draught animals. • Calculate economics of animal traction vs walking-tractor for a 2-ha farm. • Construct a simple animal-drawn cart or implement.	removal. • Operate animal-drawn plough on a small plot; • Conduct health and welfare assessment of draught animals. • Calculate economics of animal traction vs walking-tractor for a 2-ha farm. • Construct a simple animal-drawn cart or implement.	Economic worksheet. Materials for implement.
GENERAL OBJECTIVE 4.0: Operate small-scale tractors, two-wheel tractors and appropriate-scale field equipment.						
5	4.1 Describe Four-Wheel solar powered/CNG Tractors 4.2 Describe Two-Wheel solar powered/CNG Tractors 4.3 Describe Major solar powered/CNG Tractor Components 4.4 Describe	• Explain Four-Wheel solar powered Tractors • Explain Two-Wheel solar powered Tractors • Explain Major Tractor Components • Explain Attachments • Explain Fuel Efficiency • Explain Biodiesel • Explain Fuel Economy	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Identify solar powdered/CNG tractor components on a sample tractor (engine, transmission, PTO, hydraulics). • Start, drive and park a tractor under supervision.	Guide students to; • Identify solar powdered/CNG tractor components on a sample tractor (engine, transmission, PTO, hydraulics). • Start, drive and	Tractor (4-wheel and 2-wheel). Implements. Tractor checklist. Fuel measurement equipment. Safety

	Attachments 4.5 Describe Fuel Efficiency 4.6 Describe Biodiesel 4.7 Describe Fuel Economy Measures 4.8 Describe Tractor Safety 4.9 Describe Nigerian tractor brands and availability	Measures • Explain Tractor Safety • Explain Nigerian tractor brands and availability		• Attach a plough or harrow to the tractor; operate on a plot. • Operate a two-wheel walking tractor (BCS or similar). • Conduct daily tractor checks — oil, water, fuel, tyre pressure, lights. • Calculate fuel consumption per ha and cost per operation. • Practise tractor safety drills.	park a tractor under supervision. • Attach a plough or harrow to the tractor; operate on a plot. • Operate a two-wheel walking tractor (BCS or similar). • Conduct daily tractor checks — oil, water, fuel, tyre pressure, lights. • Calculate fuel consumption per ha and cost per operation. • Practise tractor safety drills.	equipment, PPE. Plot area.
GENERAL OBJECTIVE 5.0: Operate low-energy forage and fodder machinery						
6-7	5.1 Explain Forage Harvesting Chain 5.2 Explain Cutting Equipment 5.3 Describe Tedders and Rakes	• Explain Forage Harvesting Chain — cutting, drying, gathering, baling, transport, storage. • Explain Cutting	Journals Charts Projector, whiteboard Marker. Textbooks	• Operate a brush cutter or rotary mower to cut a pasture plot. • Use a hand sickle to cut and bundle	Guide students to; • Operate a brush cutter or rotary mower to cut a pasture plot. • Use a hand sickle to	Brush cutter, sickle, mower. Chopper, fresh grass. Baler, twine. Drying rack

	5.4 Describe Hay Balers 5.5 Describe Forage Choppers 5.6 Describe Silage-Making Equipment 5.7 Describe Forage Wagons and trailers for collection. 5.8 Describe Hay-Drying Sheds and Barns. 5.9 Describe Solar-Powered Forage Equipment 5.10 Describe Low-Cost Options for smallholders 5.11 Describe maintenance.	Equipment • Explain Tedders and Rakes — spread forage for drying; gather into windrows. • Explain Hay Balers • Explain Forage Choppers • Explain Silage-Making Equipment • Explain Forage Wagons and trailers for collection. • Explain Hay-Drying Sheds and Barns. • Explain Solar-Powered Forage Equipment • Explain Low-Cost Options for smallholders • Explain maintenance — blade sharpening, lubrication	Internet	forage in traditional manner. • Operate a motorised forage chopper to chop fresh grass for silage. • Make small square hay bales using manual or motorised baler. • Construct a simple hay-drying rack from local materials. • Conduct blade sharpening and routine maintenance on cutting equipment. • Compare time, energy and cost of hand vs motorised forage harvesting. • Practise safety protocols for cutting equipment.	cut and bundle forage in traditional manner. • Operate a motorised forage chopper to chop fresh grass for silage. • Make small square hay bales using manual or motorised baler. • Construct a simple hay-drying rack from local materials. • Conduct blade sharpening and routine maintenance on cutting equipment. • Compare time, energy and cost of hand vs motorised forage harvesting. • Practise safety protocols for cutting equipment.	materials. Sharpening tools, oil. Stopwatch, calculator. PPE.
GENERAL OBJECTIVE 6.0: Operate feed-processing equipment suitable for organic feed Production						
8-9	6.1 Describe Organic	• Explain Organic Feed	Journals	• Operate a hammer	Guide students to;	Hammer mill,

	Feed Mill principles 6.2 Describe Hammer Mill 6.3 Describe Roller Mill 6.4 Describe Mixers 6.5 Explain Pelletizers 6.6 Explain Cookers / Extruders 6.7 Describe Cooling and Packaging. 6.8 Explain Feed Mill Design 6.9 Describe Haccp and quality control in feed mill 6.10 Explain Small-Scale Options 6.11 Describe Feed Formulation Software 6.12 Explain organic feed restrictions Describe Nigerian feed mill industry.	Mill principles • Explain Hammer Mill • Explain Roller Mill • Explain Mixers horizontal mixer, vertical mixer; mixing time; uniformity. • Explain Pelletizers • Explain Cookers / Extruders • Explain Cooling and Packaging. • Explain Feed Mill Design • Explain Haccp and quality control • Explain Small-Scale Options • Explain Feed Formulation Software • Explain organic feed restrictions • Explain Nigerian feed mill industry	Charts Projector, whiteboard Marker. Textbooks Internet	mill to grind maize and groundnut cake. • Record output rate and particle size. • Operate a feed mixer to mix a small batch of organic-compliant chick feed. • Operate a pelletizer to produce poultry pellets. • Clean equipment between batches as per organic protocols. • Use a feed-formulation software to formulate organic broiler ration. • Conduct quality control on a finished feed batch — moisture, particle size, mixing uniformity. • Visit a Nigerian feed mill (commercial or research). • Design a small	• Operate a hammer mill to grind maize and groundnut cake. • Record output rate and particle size. • Operate a feed mixer to mix a small batch of organic-compliant chick feed. • Operate a pelletizer to produce poultry pellets. • Clean equipment between batches as per organic protocols. • Use a feed-formulation software to formulate organic broiler ration. • Conduct quality control on a finished feed batch — moisture,	ingredients. Mixer. Pelletizer. Cleaning supplies. Computer with feed software. QC equipment. Transport for visit. Design template.

				organic feed mill (1 ton/hr) for a smallholder cooperative.	particle size, mixing uniformity. • Visit a Nigerian feed mill (commercial or research). • Design a small organic feed mill (1 ton/hr) for a smallholder cooperative.	
GENERAL OBJECTIVE 7.0: Know construction and maintenance of manual and semi-automated livestock housing.						
10-11	7.1 Describe organic livestock housing principles 7.2 Explain Housing Materials 7.3 Describe Poultry Housing 7.4 Explain Cattle/Goat/Sheep Housing 7.5 Explain pig housing 7.6 Describe rabbit housing 7.7 Describe natural ventilation	• Explain organic livestock housing principles • Explain Housing Materials • Explain Poultry Housing • Explain cattle/goat/sheep housing • Explain Pig Housing — deep-bedded barn, outdoor with mudding wallows; rooting access.	Journals Charts Projector, whiteboard Marker. Textbooks Internet	• Visit organic livestock housing on institution farm; compare with IFOAM/NOAN standards. • Construct a mobile chicken coop (chicken tractor) for 20 birds using local materials. • Construct a rabbit hutch suitable for 1 doe and litter. • Install a solar-	Guide students to; • Visit organic livestock housing on institution farm; compare with IFOAM/NOAN standards. • Construct a mobile chicken coop (chicken tractor) for 20 birds using local materials. • Construct a rabbit hutch suitable for	Institutional farm housing. Construction materials. Carpentry tools. Solar fence kit. Gutter, tank, pipes. Smoke source for ventilation test. Design template.

	7.8 Describe cooling in hot climates 7.9 Describe fencing 7.10 Describe water systems 7.11 Explain Nigerian climate-adapted designs	• Explain Rabbit Housing • Explain Natural Ventilation — ridge vents, side openings, air-flow design. • Explain Cooling in hot climates — shade trees, sprinklers (water-saving design), fans (solar-powered). • Explain FENCING — traditional thorn-bush, wood, wire, electric (solar-powered). • Explain WATER SYSTEMS • Explain Nigerian climate-adapted designs — indigenous designs from Sahel/Sudan/Forest zones.		powered electric fence on a paddock. • Install a rainwater harvesting system from a poultry house roof to drinkers. • Conduct ventilation airflow assessment with simple smoke test. • Design organic housing for a 50-bird pastured layer flock with mobile coop, perimeter electric fencing, water system and shade.	1 doe and litter. • Install a solar-powered electric fence on a paddock. • Install a rainwater harvesting system from a poultry house roof to drinkers. • Conduct ventilation airflow assessment with simple smoke test. • Design organic housing for a 50-bird pastured layer flock with mobile coop, perimeter electric fencing, water system and shade.	
GENERAL OBJECTIVE 8.0: Know manure-handling, composting, vermicomposting and biogas-generation equipment.						
12-13	8.1 Explain manure production 8.2 Describe manure collection	• Explain manure production by • Explain manure collection	Journals Charts Projector, whiteboard	• Collect manure from poultry, goat and cattle units. • Weigh and record	Guide students to: • Collect and weigh manure. • Operate spreader.	Manure-handling equipment. Scales,

	8.3 Explain Manure-Handling Equipment 8.4 Explain Solid Manure composting 8.5 Describe Liquid Manure / Slurry systems. 8.6 Explain Vermicomposting Systems 8.7 Describe Biogas Digesters for manure 8.8 Explain Bio-Slurry Utilisation 8.9 Explain Deep Litter / Deep Bedding management 8.10 Describe Nigerian Energy Commission and biogas programmes.	• Explain Manure-Handling Equipment • Explain Solid Manure composting • Explain Liquid Manure / Slurry systems. • Explain Vermicomposting Systems • Explain Biogas Digesters for manure • Explain Bio-Slurry Utilisation • Explain Deep Litter / Deep Bedding management • Discuss Nigerian Energy Commission and biogas programmes.	Marker. Textbooks Internet	daily output. • Operate a wheelbarrow-mounted manure spreader. • Construct continuous-flow vermicomposting system • Construct a small biogas digester and use cattle manure. • Apply bio-slurry to a forage plot and observe response. • Manage a deep-litter poultry house for 3 months. • Harvest litter as compost. • Compute manure-based nutrient budget for a 50-bird flock or 5 lactating cow herd.	• Construct vermicomposting system. • Construct biogas digester. • Apply bio-slurry. • Manage deep litter. • Compute nutrient budget.	recording sheets. Vermicompostin g setup, worms. Biogas materials. Bio-slurry, applicator. Litter materials. Calculator, nutrient table.
GENERAL OBJECTIVE 9.0: Apply maintenance, economics, entrepreneurship and safety principles in climate-smart mechanization.						
14-15	9.1 Describe Maintenance Types	• Explain Maintenance Types: daily, weekly,	Sample maintenance	• Develop a comprehensive	Guide students to: • Develop	Maintenance schedule

	9.2 Describe Maintenance Programmes 9.3 Describe Common Maintenance 9.4 Describe Safety 9.5 Describe Economics of Climate Smart mechanization 9.6 Describe Nigerian mechanization as a service platforms 9.7 Describe Nigerian Institutions for Climate smart mechanization	monthly, annual; preventive vs corrective vs predictive. • Explain Maintenance Programmes • Explain Common Maintenance, belt tension, electrical connections, water/fuel filters. • Describe SAFETY — PPE (gloves, boots, helmet), lock-out tag-out, guards, training • Discuss Economics — capital cost, operating cost (fuel, labour, maintenance), depreciation, return on investment, break-even point. • Discuss Nigerian mechanization as a service platforms • Discuss Nigerian Institutions for Climate smart mechanization	manuals. Logbooks, checklists. PPE samples. Economic worksheets. Projector, whiteboard.	maintenance schedule for the institution farm equipment. • Conduct a maintenance audit — • Identify equipment, last service, next-due dates. • Conduct preventive maintenance on a tractor (oil change, filter change, lubrication, belt check. • Conduct safety inspection of the workshop and farm equipment. • Compute economics of operating a tractor-hire business for a 5-village area. • Develop a business plan for a renewable-energy installation enterprise.	maintenance schedule. • Conduct maintenance audit. • Conduct preventive maintenance. • Conduct safety inspection. • Compute economics. • Develop business plan. • Present capstone.	template. Audit checklist. Maintenance tools, oil, filters. Safety checklist. Economic calculator. Business plan template. Projector for presentation.

Course Assessment:

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

ANIMAL ANATOMY

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL ANATOMY	**COURSE CODE: OAP 315**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills of farm animal anatomy		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know anatomical terminologies and orientation in farm animals; 2.0 Know the major bones of the Skeletal System in farm animals; 3.0 Know the major muscles of the Muscular System and their relevance to carcass cuts and locomotion; 4.0 Know the Digestive System in monogastric (pig, rabbit), ruminant (cattle, sheep, goat) and avian (poultry) species; 5.0 Understand the Respiratory System and its anatomical features in mammalian and avian species; 6.0 Understand the Cardiovascular System; 7.0 Understand the Urogenital System in male and female farm animals; 8.0 Understand the Nervous and Endocrine Systems; 9.0 Understand the Integumentary System.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL ANATOMY	COURSE CODE: OAP 315	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills of farm animal anatomy		
GENERAL OBJECTIVE 1.0: Know anatomical terminologies and orientation in farm animals		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define anatomy and its branches 1.2 Define anatomical terms of position 1.3 Explain planes of the body 1.4 Explain directional terms specific to limbs 1.5 Describe body regions 1.6 Explain major body cavities 1.7 Describe	• Explain anatomy and its branches. • Explain anatomical terms of position. • Explain body planes. • Explain limb directional terms. • Explain body regions. • Explain body cavities. • Explain membranes. • Explain principal tissues.	Anatomical charts and posters. Models, specimens. Reference textbooks Projector, whiteboard.	• Identify anatomical positions and planes on a live animal (cattle, goat, chicken). • Label body regions on photographs and live animals. • Identify body cavities on a dissected specimen (rabbit or chicken). • Use anatomical terminology to describe findings during a clinical examination.	Guide students to; • Identify anatomical positions and planes on a live animal (cattle, goat, chicken). • Label body regions on photographs and live animals. • Identify body cavities on a dissected specimen (rabbit or chicken). • Use anatomical	Live animals, models. Dissection specimens. Dissecting kits, PPE. Microscope, prepared slides. Anatomical charts.

	membranes 1.8 Describe the four principal tissue types			• Examine the four tissue types under microscope on prepared slides.	terminology to describe findings during a clinical examination. • Examine the four tissue types under microscope on prepared slides.	
GENERAL OBJECTIVE 2.0: Know the major bones of the Skeletal System in farm animals.						
2-3	2.1 Describe the functions of the skeletal system. 2.2 Describe bone classification 2.3 Describe Axial Skeleton 2.4 Describe Appendicular Skeleton of forelimb 2.5 Describe Appendicular Skeleton of hindlimb. 2.6 Describe Ruminant Skeletal Features 2.7 Describe Pig Skeletal Features	• Explain skeletal functions. • Explain bone classification. • Explain axial skeleton. • Discuss forelimb skeleton. • Explain hind limb skeleton. • Explain ruminant features. • Discuss pig features. • Explain avian features. • Explain rabbit features. • Explain joints. • Explain bone growth. • Describe age determination.	Anatomical charts of skeleton. Reference textbooks. Projector, whiteboard.	• Identify major bones on assembled skeletons of cattle, sheep, chicken, rabbit. • Identify joints and their types. • Examine bone cross-sections. • Examine pneumatic bone of chicken. • Observe air-sac connection. • Conduct age determination on dentition (eruption sequence) on live and dead animals. • Compare skeleton of cattle and sheep highlighting similarities and differences.	Guide students to; • Identify and label major bones on assembled skeletons of cattle, sheep, chicken, rabbit. • Identify joints and their types. • Examine bone cross-sections. • Examine pneumatic bone of chicken; • Observe air-sac connection. • Conduct age determination on dentition (eruption sequence) on live and dead animals.	Articulated skeletons, individual bones. Anatomical charts. Bone saws, magnifiers. Dentition charts. Live animals. PPE.

	2.8 Describe Avian SkeletaL Features 2.9 Describe Rabbit Skeletal Features 2.10 Describe Joints 2.11 Describe Bone Growth 2.12 Describe Age Determination from skeletal features.				• Compare skeletons of cattle and sheep highlighting similarities and differences.	
GENERAL OBJECTIVE 3.0: Know the major muscles of the Muscular System and their relevance to carcass cuts and locomotion.						
4	3.1 Describe muscle types. 3.2 Describe muscle attachment. 3.3 Describe major muscle groups by region: 3.4 Describe Muscle Function 3.5 Describe Muscle Physiology 3.6 Describe Carcass Cuts and their muscular origin 3.7 Describe Avian Musculature	• Explain muscle types. • Explain muscle attachment. • Explain major muscle groups. • Explain muscle function. • Explain muscle physiology. • Explain carcass cuts. • Explain avian musculature. • Explain rabbit musculature.	Muscle charts and posters. Anatomical models. Reference textbooks. Projector, whiteboard.	• Conduct dissection of a chicken or rabbit; • Identify major muscles. • Visit a slaughterhouse or meat-cutting demonstration to identify cuts and underlying muscles. • Identify muscle types under microscope (prepared slides of skeletal, smooth, cardiac). • Examine carcass cuts in butcher (forequarter, hindquarter, primal cuts). • Trace function of major locomotor muscles in cattle	Guide students to; • Conduct dissection of a chicken or rabbit; • Identify major muscles. • Visit a slaughterhouse or meat-cutting demonstration to identify cuts and underlying muscles. • Identify muscle types under microscope (prepared slides of skeletal, smooth, cardiac). • Examine carcass cuts	Dissection specimens, kit. Transport for slaughterhouse. Microscope, slides. Carcass samples. Charts and reference texts. PPE.

	3.8 Describe Rabbit Musculature			vs sheep.	in butcher (forequarter, hindquarter, primal cuts). • Trace function of major locomotor muscles in cattle vs sheep.	
GENERAL OBJECTIVE 4.0: Compare the Digestive System in monogastric (pig, rabbit, poultry), ruminant (cattle, sheep, goat) and avian (poultry) species.						
5-7	4.1 Explain functions of Digestive system 4.2 Describe Monogastric (pig) digestive 4.3 Describe Horse digestive system 4.4 Describe Rabbit Digestive System 4.5 Describe Ruminant digestive system 4.6 Describe rumen function 4.7 Describe omasum and abomasum 4.8 Describe small	• Explain general digestive tract. • Explain monogastric pig. • Explain horse. • Explain rabbit. • Explain ruminant. • Explain rumen function. • Explain omasum and abomasum. • Describe small/large intestine. • Explain dentition. • Explain avian digestive system. • Explain accessory organs.	Digestive system charts. Microscope slides, Reference textbooks. Projector, whiteboard.	• Dissect a chicken to expose digestive tract; • Identify crop, proventriculus, gizzard, intestines, cloaca. • Dissect a rabbit to expose enlarged caecum; • Observe caecal contents. • Examine cattle/sheep ruminant compartments at slaughterhouse — rumen, reticulum, omasum, abomasum. • Examine rumen contents under microscope — protozoa, bacteria. • Conduct dentition examination on cattle,	Guide students to; • Dissect a chicken to expose digestive tract; • Identify crop, proventriculus, gizzard, intestines, cloaca. • Dissect a rabbit to expose enlarged caecum; • Observe caecal contents. • Examine cattle/sheep ruminant compartments at slaughterhouse — rumen, reticulum,	Dissection specimens (chicken, rabbit). Transport for slaughterhouse. Microscope, slides. Cattle/sheep/goat /pig/horse jaws. Dissecting kits. Charts and references. PPE.

	intestine and large intestine in ruminants. 4.9 Describe Dentition 4.10 Describe Avian Digestive System 4.11 Describe Accessory Organs 4.12 Describe Caecum 4.13 Describe Age-Related Changes in digestive anatomy 4.14 Describe Organic Relevance	• Explain caecum. • Explain age-related changes. • Explain organic relevance.		sheep, goat, pig, horse, rabbit; • Record dental formula and approximate age. • Examine accessory organs (liver, pancreas, gallbladder) in dissection. • Compare gizzard contents in different bird species. • elate digestive anatomy to organic feeding strategies for cattle, pig, chicken, rabbit.	omasum, abomasum. • Examine rumen contents under microscope — protozoa, bacteria. • Conduct dentition examination on cattle, sheep, goat, pig, horse, rabbit; • Record dental formula and approximate age. • Examine accessory organs (liver, pancreas, gallbladder) in dissection. • Compare gizzard contents in different bird species. • Relate digestive anatomy to organic feeding strategies for cattle, pig, chicken, rabbit.	
GENERAL OBJECTIVE 5.0: Understand the Respiratory System and its anatomical features in mammalian and avian species.						
8	5.1 Describe Mammalian Respiratory System	• Explain mammalian respiratory system. • Explain nasal	Respiratory system charts.	• Dissect chicken or pigeon to expose respiratory system;	Guide students to; • Dissect chicken or pigeon to expose	Dissection specimens. Slaughterhouse

	5.2 Describe nasal turbinates 5.3 Describe larynx 5.4 Explain trachea, bronchi, bronchioles 5.5 Describe alveoli 5.6 Describe Lungs 5.7 Explain Diaphragm respiratory muscles. 5.8 Describe Avian Respiratory System 5.9 Describe Respiratory Defence	turbinates. • Explain larynx. • Explain trachea/bronchi. • Explain alveoli. • Explain lungs. • Explain diaphragm. • Explain avian respiratory system. • Explain respiratory defence.	Reference textbooks. Projector, whiteboard. Journal Internet	• Identify air sacs. • Dissect goat/sheep at slaughterhouse to expose lungs and diaphragm. • Examine lung tissue under microscope (alveoli, bronchioles). • Conduct lung inflation test to demonstrate alveolar function. • Assess respiratory health in live animals • Examine larynx with vocal cords on a fresh sheep specimen.	respiratory system; • Identify air sacs. • Dissect goat/sheep at slaughterhouse to expose lungs and diaphragm. • Examine lung tissue under microscope (alveoli, bronchioles). • Conduct lung inflation test to demonstrate alveolar function. • Assess respiratory health in live animals • Examine larynx with vocal cords on a fresh sheep specimen.	visit. Microscope, slides. Inflation apparatus. Live animals. PPE.
GENERAL OBJECTIVE 6.0: Understand the Cardiovascular System						
9	6.1 Describe the Heart 6.2 Describe Conduction System 6.3 Describe Systemic Circulation 6.4 Describe	• Explain heart. • Explain conduction system. • Explain systemic circulation. • Explain pulmonary	Heart and circulation charts, Reference textbooks. Projector,	• Dissect a fresh heart (sheep or pig) to identify chambers, valves, vessels. • Trace circulation on chart and on live animal pulse. • Conduct cardiac	Guide students to; • Dissect a fresh heart (sheep or pig) to identify chambers, valves, vessels. • Trace circulation on	Heart specimens, dissection kit. Charts of circulation. Stethoscopes. Live animals.

	Pulmonary Circulation 6.5 Explain Major Vessels 6.6 Describe Blood 6.7 Explain Lymphatic System 6.8 Describe lymph node distribution 6.9 Describe Foetal Circulation 6.10 Explain Avian Cardiovascular Features	circulation. • Explain major vessels. • Explain blood. • Explain lymphatic system. • Explain lymph node distribution. • Explain foetal circulation. • Explain avian features.	whiteboard Internet Journal.	auscultation on live animal with stethoscope. • Measure heart rate in different species (cattle 60–80; sheep 70–100; horse 30–40; chicken 250–400). • Examine major lymph nodes on a carcass — important for meat inspection. • Examine blood films under microscope	chart and on live animal pulse. • Conduct cardiac auscultation on live animals with stethoscope. • Measure heart rate in different species (cattle 60–80; sheep 70–100; horse 30–40; chicken 250–400). • Examine major lymph nodes on a carcass — important for meat inspection. • Examine blood films under microscope	Carcass for inspection. Microscope, slides.
GENERAL OBJECTIVE 7.0: Understand the Urogenital System in male and female farm animals.						
10-11	7.1 Describe Urinary System 7.2 Describe kidney structure 7.3 Explain species variation rabbit unipapillate. 7.4 Describe avian urinary system 7.5 Describe Male	• Explain urinary system. • Explain kidney structure. • Explain species variation. • Explain avian urinary. • Explain male reproductive. • Explain female	Urogenital charts Reference textbooks. Projector, whiteboard Internet Journal.	• Dissect male and female reproductive tracts (sheep/goat/chicken). • Examine kidneys from cattle and sheep at slaughterhouse • Compare structure. • Examine udder structure on dairy cattle or goat — quarters/halves, teats.	Guide students to; • Dissect male and female reproductive tracts (sheep/goat/chicken) • Examine kidneys from cattle and sheep at slaughterhouse • Compare structure.	Dissection specimens. Slaughterhouse visit. Live dairy animals. Foetal specimens or photos. Dissecting kits. PPE.

	Reproductive System 7.6 Describe Female Reproductive System 7.7 Describe Ruminant Reproductive Features 7.8 Describe Avian Reproductive System 7.9 Describe Mammary Gland 7.10 Describe age-related change.	reproductive. • Explain ruminant reproductive features. • Explain avian reproductive. • Explain mammary gland. • Explain age-related changes.		• Identify pregnancy stages from foetal specimens (or photos). • Identify normal vs abnormal reproductive structures. • Examine avian egg formation in oviduct of mature laying hen at slaughter.	• Examine udder structure on dairy cattle or goat — quarters/halves, teats. • Identify pregnancy stages from foetal specimens (or photos). • Identify normal vs abnormal reproductive structures. • Examine avian egg formation in oviduct of mature laying hen at slaughter.	
GENERAL OBJECTIVE 8.0: Understand the Nervous and Endocrine Systems						
12-13	8.1 Explain Nervous System organisation 8.2 Describe Brain structure 8.3 Explain Spinal Cord. 8.4 Describe Cranial Nerves (12 pairs) 8.5 Describe Sense	• Explain nervous system organisation. • Explain brain. • Explain spinal cord. • Discuss cranial nerves. • Explain sense organs.	Brain and gland models. Preserved specimens. Reference textbooks. Projector, whiteboard Journals	• Dissect a sheep/goat brain to identify cerebrum, cerebellum, brainstem. • Identify cranial nerves on a brain specimen. • Dissect eye and examine internal structures. • Identify major endocrine glands on a fresh dissection.	Guide students to; • Dissect a sheep/goat brain to identify cerebrum, cerebellum, brainstem. • Identify cranial nerves on a brain specimen. • Dissect eye and	Brain specimens, dissection kit. Eye specimens. Endocrine specimens. Microscope, slides. Live animals. PPE.

	Organs. 8.6 Describe Eye 8.7 Describe Ear 8.8 Describe Endocrine Glands: 8.9 Describe Hormone-Receptor action (introductory). 8.10 Describe organic relevance	• Explain eye. • Explain ear. • Explain endocrine glands. • Explain pituitary. • Explain thyroid/parathyroid • Explain adrenal. • Explain pancreas. • Explain gonads. • Explain pineal. • Explain hypothalamus. • Explain hormone-receptor action. • Explain organic relevance.	Internet.	• Examine nervous and endocrine tissue under microscope. • Conduct simple reflex test on a live animal (palpebral, withdrawal, pupillary).	examine internal structures. • Identify major endocrine glands on a fresh dissection. • Examine nervous and endocrine tissue under microscope. • Conduct simple reflex test on a live animal (palpebral, withdrawal, pupillary).	
GENERAL OBJECTIVE 9.0: Understand the Integumentary System						
14-15	9.1 Describe Skin structure 9.2 Describe skin Glands 9.3 Explain Hair 9.4 Explain Wool 9.5 Explain Feathers 9.6 Explain Horns 9.7 Explain Hooves and Claws	• Explain Skin structure • Explain skin Glands • Explain Hair • Explain Wool • Describe Feathers • Explain Horns • Describe Hooves and Claws • Explain Avian	Reference textbooks. Projector, whiteboard Journal Internet.	• Examine skin sections under microscope; • Identify layers and structures. • Examine hair, wool and feather samples; describe structure. • Trim Hoof on a sheep/goat under supervision.	Guide students to: • Examine skin sections. • Examine hair/wool/feather. • Conduct hoof trimming. • Examine horn cross-section.	Microscope, prepared slides. Hair/wool/feather samples. Hoof-trimming tools, live animals. Horn samples. Live poultry. Body condition

	9.8 Describe Avian Integument 9.9 Describe Beak 9.10 Describe Skin Colour 9.11 Describe organic relevance 9.12 Describe FAT	Integument • Explain Beak • Discuss Skin Colour • Discuss organic relevance — hides and skin Describe fat.		• Examine horn cross-section. • Examine beak structure on a live chicken. • Conduct Body Condition scoring on live animals based on integument signs.	• Examine beak. • Conduct condition scoring.	scoring guide. Transport for tannery visit. Reference guide template.
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

ANIMAL PHYSIOLOGY

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL PHYSIOLOGY	**COURSE CODE: OAP 316**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills of farm animal physiology		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know principles of cell physiology and homeostasis to farm animal function; 2.0 Understand the physiology of blood, body fluids and the immune system; 3.0 Understand cardiovascular physiology; 4.0 Understand respiratory physiology; 5.0 Know comparative digestive physiology of monogastric, ruminant and avian species in organic feeding; 6.0 Understand excretory physiology, fluid-electrolyte balance and thermoregulation; 7.0 Understand endocrine physiology; 8.0 Understand reproductive physiology and lactation in organic livestock systems; 9.0 Understand neurophysiology, special senses, behaviour and stress physiology with welfare implications.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ANIMAL PHYSIOLOGY	COURSE CODE: OAP 316	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills of farm animal physiology		
GENERAL OBJECTIVE 1.0: Know principles of cell physiology and homeostasis to farm animal function.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define physiology; 1.2 Describe its branches. 1.3 Define cell as the structural and functional unit of life. 1.4 Explain cell membrane structure 1.5 Describe membrane transport 1.6 Describe major	• Explain physiology and its branches. • Explain cell as the structural and functional unit of life. • Explain cell membrane structure • Explain membrane transport • Explain major organelles • Explain Homeostasis • Explain set points and physiological ranges forbody temperature,	Textbooks Journal Projector, Whiteboard Marker Internet.	• Examine plant and animal cells under microscope; • Identify membrane, nucleus, cytoplasm. • Demonstrate osmosis with potato slices or red blood cells in different solutions. • Conduct simple homeostasis demonstrations • Measure body	Guide students to; • Examine plant and animal cells under microscope; • Identify membrane, nucleus, cytoplasm. • Demonstrate osmosis with potato slices or red blood cells in different solutions. • Conduct simple homeostasis demonstrations	Microscope, slides. Potato, salt solutions. Thermometer, live animals. Stress-response scenarios.

	organelles 1.7 Explain Homeostasis 1.8 Explain set points and physiological ranges for body temperature, pH, glucose, electrolytes. 1.9 Describe cell metabolism 1.10 Describe cellular response to stress	pH, glucose, electrolytes. • Explain cell metabolism • Explain cellular response to stress		temperature changes during exercise. • Trace homeostatic responses to dehydration, hypothermia, heat stress in livestock.	• Measure body temperature changes during exercise. • Trace homeostatic responses to dehydration, hypothermia, heat stress in livestock.	
GENERAL OBJECTIVE 2.0: Understand the physiology of blood, body fluids and the immune system.						
3-4	2.1 Describe Body Fluid Compartments 2.2 Describe Blood Composition 2.3 Describe Haematocrit 2.4 Describe RBC and Haemoglobin 2.5 Describe WBC types 2.6 Describe Haemostasis. 2.7 Describe Immune	• Explain body fluid compartments. • Explain blood composition. • Explain haematocrit. • Explain RBC and haemoglobin. • Explain WBC types. • Explain haemostasis. • Explain immune system. • Explain antibodies. • Explain immunisation. • Explain colostrum.	Textbooks Journal Projector, Whiteboard Marker Internet.	• Collect blood samples from cattle/sheep/chicken (jugular vein, wing vein). • Conduct PCV (packed cell volume) determination using haematocrit centrifuge. • Prepare blood smears, stain with Giemsa or Wright;	Guide students to; • Collect blood samples from cattle/sheep/chicken (jugular vein, wing vein). • Conduct PCV (packed cell volume) determination using haematocrit centrifuge. • Prepare blood smears, stain with	Live animals, syringes. Haematocrit centrifuge, tubes. Microscope, slides, stains. Counting chamber. Colostrum samples. Vaccines, syringes. PPE.

	System 2.8 Describe Antibodies 2.9 Describe Immunisation 2.10 Describe Colostrum			• Identify cell types under microscope. • Conduct total and differential WBC count. • Examine colostrum under microscope; • Observe immunoglobulin content visually. • Administer a vaccine to a live bird (organic-approved). • Conduct simple blood typing test or coagulation time.	Giemsa or Wright; identify cell types under microscope. • Conduct total and differential WBC count. • Examine colostrum under microscope; observe immunoglobulin content visually. • Administer a vaccine to a live bird (organic-approved). • Conduct simple blood typing test or coagulation time.	
GENERAL OBJECTIVE 3.0: Understand cardiovascular physiology						
5	3.1 Describe Cardiac Cycle 3.2 Describe Heart Sounds 3.3 Describe Cardiac Output 3.4 Describe Control Of Cardiac Output 3.5 Describe Blood	• Explain cardiac cycle. • Explain heart sounds. • Explain cardiac output. • Describe control of CO. • Explain blood pressure. • Explain BP regulation. • Explain microcirculation. • Explain circulation control.	Textbooks Journal Projector, Whiteboard Marker Internet.	• Conduct cardiac auscultation on live cattle, sheep, goat, rabbit; • Identify S1 and S2. • Measure heart rate in different species at rest and after exercise.	Guide students to; • Conduct cardiac auscultation on live cattle, sheep, goat, rabbit; • Identify S1 and S2. • Measure heart rate in different species at rest and after	Stethoscopes. Live animals. Stopwatch. ECG strips/equipment. Calculator. Recording sheets.

	Pressure 3.6 Describe Bp Regulation 3.7 Describe Microcirculation. 3.8 Describe Circulation Control 3.9 Describe Exercise Physiology 3.10 Describe Heat Stress and Circulation	• Explain exercise physiology. • Explain heat stress.		• Measure pulse rate at common arteries (caudal artery in cattle; femoral in dogs). • Examine ECG strip if equipment is available or interpret sample ECGs. • Conduct exercise tolerance test on a working animal. • Calculate cardiac output and stroke volume from sample data.	exercise. • Measure pulse rate at common arteries (caudal artery in cattle; femoral in dogs). • Examine ECG strip if equipment is available or interpret sample ECGs. • Conduct exercise tolerance test on a working animal. • Calculate cardiac output and stroke volume from sample data.	
GENERAL OBJECTIVE 4.0: Understand respiratory physiology						
6-7	4.1 Describe Respiratory Mechanics 4.2 Describe Lung Volumes 4.3 Describe Respiratory Rate 4.4 Describe Dead Space	• Explain respiratory mechanics. • Explain lung volumes • Explain respiratory rate. • Explain dead space. • Explain gas exchange. • Explain O_2 transport. • Explain CO_2 transport. • Explain regulation.	Textbooks Journal Projector, Whiteboard Marker Internet.	• Measure respiratory rate in different species at rest and post-exercise. • Conduct respiratory auscultation; • Identify normal and abnormal sounds. • Measure tidal	• Measure respiratory rate in different species at rest and post-exercise. • Conduct respiratory auscultation; • Identify normal and abnormal sounds. • Measure tidal	Stopwatch, live animals. Stethoscopes. Spirometer or improvised. Heat source, thermometer. Lime water for CO_2 test.

	4.5 Describe Gas Exchange 4.6 Describe O_2 Transport 4.7 Describe CO_2 Transport 4.8 Describe Respiratory Regulation 4.9 Describe Avian Respiration 4.10 Describe Thermoregulation via respiration 4.11 Describe Altitude adaptation.	• Explain avian respiration. • Explain respiratory thermoregulation. • Explain altitude adaptation.		volume on a spirometer (or by face-mask + bag). • Measure respiratory rate before and during heat exposure. • Conduct gas exchange demonstration (carbon dioxide in expired air). • Compare respiratory rate in young vs adult animals of same species.	volume on a spirometer (or by face-mask + bag). • Measure respiratory rate before and during heat exposure. • Conduct gas exchange demonstration (carbon dioxide in expired air). • Compare respiratory rate in young vs adult animals of same species.	Recording sheets.
GENERAL OBJECTIVE 5.0: Know comparative digestive physiology of monogastric, ruminant and avian species in organic feeding.						
8	5.1 Describe Motility 5.2 Describe Secretions 5.3 Describe Digestion 5.4 Describe Absorption 5.5 Describe Monogastric Digestion 5.6 Describe Ruminant	• Explain motility. • Explain secretions. • Explain digestion. • Explain absorption. • Explain monogastric digestion. • Explain ruminant digestion. • Explain rumen microbes.	Textbooks Journal Projector, Whiteboard Marker Internet.	• Measure rumen pH • Examine rumen fluid under microscope; • Identify protozoa and bacteria. • Conduct simple in-vitro feed digestibility test (Tilley-Terry style).	Guide students to; • Measure rumen pH • Examine rumen fluid under microscope; • Identify protozoa and bacteria. • Conduct simple in-vitro feed digestibility test	pH meter, rumen sample. Microscope, slides. Digestibility kit. pH paper. Dissection specimens. Live animals, feeds.

	Digestion 5.7 Describe rumen microbes 5.8 Describe rumination (cud-chewing). 5.9 Describe rumen physiology 5.10 Describe Microbial Protein Synthesis 5.11 Describe Rabbit Digestion 5.12 Describe Avian Digestion 5.13 Describe Organic Feeding Implications	• Explain rumination. • Explain rumen physiology. • Explain microbial protein. • Explain rabbit digestion. • Explain avian digestion. • Explain organic implications.		• Measure salivary pH in different animal species. • Examine gastric vs avian digestive tract motility in dissection. • Feed different feeds to ruminants. • Observe rumination behaviour. • Design organic rations exploiting comparative digestive features.	(Tilley-Terry style). • Measure salivary pH in different animal species. • Examine gastric vs avian digestive tract motility in dissection. • Feed different feeds to ruminants. • Observe rumination behaviour. • Design organic rations exploiting comparative digestive features.	Ration template.
GENERAL OBJECTIVE 6.0: Understand excretory physiology, fluid-electrolyte balance and thermoregulation.						
9-10	6.1 Describe Kidney Function 6.2 Describe Nephron physiology 6.3 Describe Regulation 6.4 Describe Urine composition 6.5 Describe Fluid Balance	• Discuss kidney function. • Discuss nephron physiology. • Explain hormonal regulation. • Explain urine composition. • Discuss fluid balance. • Explain electrolyte balance.	Textbooks Journal Projector, Whiteboard Marker Internet.	• Collect urine sample; • Examine appearance, pH, specific gravity. • Conduct simple urine dipstick test for proteins, glucose, ketones. • Measure water	Guide students to; • Collect urine sample; • Examine appearance, pH, specific gravity. • Conduct simple urine dipstick test for proteins, glucose, ketones.	Sample bottles. Urine dipsticks. Drinkers, water flow meter. Thermometers. THI table, hygrometer. Live animals. Lab kit. Design template.

	6.6 Describe Electrolyte Balance 6.7 Explain Acid-Base Balance 6.8 Describe Avian Excretion. 6.9 Describe Thermoregulation 6.10 Describe heat exchange mechanisms 6.11 Explain Thermoneutral Zone and species variations 6.12 Explain Heat Stress 6.13 Describe Cold Stress 6.14 Describe Organic Implications	• Discuss acid-base balance. • Discuss avian excretion. • Explain thermoregulation. • Discuss heat exchange. • Explain thermoneutral zone. • Explain heat stress. • Explain cold stress. • Explain organic implications.		consumption in different species over 24 h; • Measure body temperature (rectal) in different species; • Observe diurnal variation. • Conduct thermal stress assessment using THI on a hot day. • Observe behavioural thermoregulation — panting, sweating, shade-seeking. • Compare urine composition between cattle and chicken. • Design thermoregulation strategies for an organic poultry house	• Measure water consumption in different species over 24 h • Measure body temperature (rectal) in different species; observe diurnal variation. • Conduct thermal stress assessment using THI on a hot day. • Observe behavioural thermoregulation — panting, sweating, shade-seeking. • Compare urine composition between cattle and chicken. • Design thermoregulation strategies for an organic poultry house	
GENERAL OBJECTIVE 7.0: Understand endocrine physiology						
11-12	7.1 Define hormone:	• Discuss hormone,	Textbooks	• Examine endocrine	Guide students to;	Dissection

	• Endocrine, • Autocrine, • Paracrine. 7.2 Describe hormone Classification 7.3 Describe mechanism of action 7.4 Describe Hypothalamus-Pituitary axis 7.5 Describe Functions of major hormones with physiological detail 7.6 Describe Feedback loops 7.7 Describe Organic Relevance 7.8 Describe Stress Physiology	✓ Endocrine ✓ Autocrine ✓ Paracrine • Explain hormone Classification ✓ protein/peptide (insulin, GH, FSH, LH), steroid (cortisol, oestrogen, testosterone), amino-acid derived (thyroid, epinephrine). • Explain mechanism of action • Explain Hypothalamus-Pituitary axis • Explain functions of major hormones with physiological detail: ✓ GH (growth, IGF-1) ✓ Thyroid (metabolic rate) ✓ Cortisol (stress, gluconeogenesis ✓ Insulin/glucagon (glucose) ✓ ADH (water) ✓ Aldosterone (Na/K)	Journal Projector, Whiteboard Marker Internet.	glands on a fresh dissection • Conduct simple blood glucose test before and after feeding. • Examine the effect of photoperiod on poultry laying (compare laying rates in different light regimes). • Conduct heat-detection in cattle/goat; • Correlate with oestrogen surge signs. • Trace the hormonal cascade controlling lactation initiation.	• Examine endocrine glands on a fresh dissection • Conduct simple blood glucose test before and after feeding. • Examine the effect of photoperiod on poultry laying (compare laying rates in different light regimes). • Conduct heat-detection in cattle/goat; • Correlate with oestrogen surge signs. • Trace the hormonal cascade controlling lactation initiation.	specimens. Glucose meter. Layer flock with light control. Live cattle/goat. Hormone cascade chart.

		✓ Oestrogen, progesterone (cycles, pregnancy) ✓ Testosterone (male reproductive) ✓ Oxytocin (parturition, milk let-down) ✓ Prolactin (lactation ✓ Melatonin (photoperiod, seasonal). • Explain Feedback loops • Explain Organic Relevance • Explain Stress Physiology				
GENERAL OBJECTIVE 8.0: Understand reproductive physiology and lactation in organic livestock systems.						
13	8.1 Describe Male Reproductive Physiology 8.2 Describe Female Reproductive Physiology 8.3 Describe Species Specifics 8.4 Describe Signs Of Oestrus	• Explain Male Reproductive Physiology — spermatogenesis; testosterone; libido; mating behaviour. • Explain Female Reproductive Physiology oogenesis; oestrous cycle phases (proestrus, oestrus, metoestrus, dioestrus).	Textbooks Journal Projector, Whiteboard Marker Internet.	• Detect heat in cattle/goat/sheep using observation and marker techniques. • Examine semen under microscope; • Assess motility and morphology. • Observe	Guide students to; • Detect heat in cattle/goat/sheep using observation and marker techniques. • Examine semen under microscope; • Assess motility and morphology.	Live animals. Semen sample, microscope. Birthing record. Lactometer, milk analyser. Newborn animal, colostrum. Sample records. CMT paddle and

	8.5 Describe Fertilisation 8.6 Describe Implantation and pregnancy maintenance 8.7 Describe Pregnancy Duration 8.8 Describe Parturition 8.9 Describe Lactation 8.10 Describe Colostrum 8.11 Describe Lactation Curves. 8.12 Describe Species Milk Composition 8.13 Describe Organic Lactation 8.14 Describe Mastitis	• Explain Species Specifics • Explain Signs of Oestrus — mucus discharge, mounting, restlessness, decreased intake, vocalisation. • Explain Fertilisation — sperm capacitation, acrosome reaction, zygote, cleavage. • Explain Implantation and pregnancy maintenance — progesterone. • Explain Pregnancy Duration • Explain Parturition • Explain Lactation • Explain Colostrum • Explain Lactation Curves. • Explain Species Milk Composition • Explain Organic Lactation • Explain Mastitis		parturition. • Measure milk composition (fat, protein, lactose) using lactometer or milk analyser. • Observe colostrum feeding to newborn; • Assess passive immunity transfer. • Construct lactation curve from sample dairy records. • Conduct California Mastitis Test (CMT) on milk samples.	• Observe parturition. • Measure milk composition (fat, protein, lactose) using lactometer or milk analyser. • Observe colostrum feeding to newborn; • Assess passive immunity transfer. • Construct lactation curve from sample dairy records. • Conduct California Mastitis Test (CMT) on milk samples.	reagent.
GENERAL OBJECTIVE 9.0: Understand neurophysiology, special senses, behaviour and stress physiology in organic Animals						
14-15	9.1 Describe Neuron 9.2 Describe Neurotransmitters 9.3 Describe Reflex	• Explain neuron. • Explain neurotransmitters.	Textbooks Journal Projector, Whiteboard	• Conduct reflex tests on live animals (palpebral, withdrawal,	Guide students to; • Conduct reflex tests on live animals	Live animals. Senses test materials. Behavioural

	ARC. 9.4 Describe Brain Functions 9.5 Describe Special Senses 9.6 Describe Behaviour 9.7 Describe Five Domains welfare framework. 9.8 Describe Human-Animal Interaction 9.9 Describe Stress 9.10 Describe Stress-Mitigating practices in organic 9.11 Describe Organic Welfare Standards. 9.12 Describe Behavioural Indicators of welfare 9.13 Describe entrepreneurial roles	• Explain reflex arc. • Explain brain functions. • Explain special senses. • Explain behaviour. • Explain Five Domains. • Explain human-animal interaction. • Explain stress. • Explain stress mitigation. • Explain organic welfare. • Explain behavioural indicators. • Explain entrepreneurial roles. • Capstone discussion.	Marker Internet.	patellar). • Test special senses — hearing (sound response), vision (object tracking), smell (food preference). • Observe species-specific behaviours — grazing, dust-bathing, rooting, herding; • Record time-budgets. • Conduct Five Domains welfare assessment on a herd or flock. • Measure stress indicators — cortisol via saliva (if equipment available), heart rate, activity. • Perform low-stress livestock handling; • Demonstrate gentle approach techniques. • Develop a physiology-informed organic welfare audit tool.	(palpebral, withdrawal, patellar). • Test special senses — hearing (sound response), vision (object tracking), smell (food preference). • Observe species-specific behaviours — grazing, dust-bathing, rooting, herding; • Record time-budgets. • Conduct Five Domains welfare assessment on a herd or flock. • Measure stress indicators — cortisol via saliva (if equipment available), heart rate, activity. • Perform low-stress livestock handling; • Demonstrate gentle approach techniques. • Develop a physiology-informed organic welfare audit tool.	ethogram. Five Domains protocol. Cortisol kit (if available). Handling chute. Audit tool template.
Course Assessment:						

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

ORGANIC FARM PRACTICE I

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC FARM PRACTICE I	**COURSE CODE: OAP 317**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 0 HOURS/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 4 HOURS/WEEK**
GOAL: This course is designed to equip students with skills to develop direct hands-on experience of organic livestock.		

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

1.0 Demonstrate competent orientation to organic farm operations, biosecurity, safety and tool use;
2.0 Carry out soil sampling, composting and soil-amendment application practices;
3.0 Carry out pasture management practices;
4.0 Carry out daily husbandry routines for cattle in organic systems;
5.0 Carry out daily routines for small ruminants in organic systems;
6.0 Perform Poultry husbandry under free-range and semi-intensive organic systems;
7.0 Conduct daily routine practices for micro livestock in organic systems;
8.0 Perform organic feeding practice;
9.0 Carry Out animal welfare assessment using the Five Domains framework;
10.0 Keep records of organic animal production systems for certification and NSO compliance.

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION						
COURSE TITLE: ORGANIC FARM PRACTICE I			COURSE CODE: OAP 317		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL:	
YEAR: I SEMESTER: I			PRE-REQUISITE: NIL		PRACTICAL: 4 HOURS/WEEK	
COURSE SPECIFICATION: PRACTICAL						
GOAL: This course is designed to equip students with skills to develop direct hands-on experience of organic livestock.						
GENERAL OBJECTIVE 1.0: Demonstrate competent orientation to organic farm operations, biosecurity, safety and tool use.						
THEORETICAL CONTENT				PRACTICAL ACTIVITIES		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1				• Tour the institution organic farm: pastures, animal units, feed store, compost area, milking, office, biosecurity gates. • Identify all major tools — spades, forks, machetes, wheelbarrows, mowers, milking pail. • Remove PPE; • Practise footbath and hand-washing at biosecurity entry.	Guide students to: • Lead farm tour. • Identify tools. • Remove PPE. • Practice biosecurity. • Demonstrate tool care. • Supervise lifting practice. • Sign checklist.	Organic farm. All standard tools. PPE kit per student. Footbath, disinfectant. Hand-washing station. Sharpening tools. Orientation checklist. Logbook.

				• Carry out tool cleaning, drying, oiling, sharpening and storage. • Lift, carry, handle a 25 kg feed bag safely. • Follow farm safety signage. • Complete farm orientation checklist		
GENERAL OBJECTIVE 2.0: Carry out soil sampling, composting and soil-amendment application practices.						
2				• Collect soil samples from 5 farm locations using soil auger; label, pack, send for analysis. • Turn an existing windrow compost pile; measure temperature; record moisture. • Construct a new compost pile from cattle manure + maize stover + cowpea residues + grass. • Harvest mature vermicompost from vermibins; sieve; bag for storage. • Apply mature compost to a 100 m² pasture plot at 5	• Supervise soil sampling. • Supervise compost turning. • Supervise new pile construction. • Supervise vermicompost harvest. • Supervise compost application. • Supervise biofertilizer application. • Review records.	Soil augers, sample bags, labels. Compost piles, ingredients, water. Vermicompost bins, sieves. Compost spreader. Rhizobium inoculant, seeds. Record sheets, logbook, PPE.

				t/ha equivalent. • Apply liquid biofertilizer (Rhizobium suspension) to legume seeds. • Complete record sheet and reflective logbook entry.		
GENERAL OBJECTIVE 3.0: Carry out pasture management practices including rotational and deferred grazing.						
3-4				• Tour all paddocks. • Identify rotation schedule and current paddock in use. • Install movable electric fence to create new paddock subdivision. • Open gate and move animals from one paddock to next; • Record date and numbers. • Assess sward height at 5 random points pre- and post-grazing; • Conduct botanical composition assessment using step-point method. • Clean water trough and refill in paddock. • Top-dress a degraded patch with compost;	• Supervise paddock tour. • Supervise fence install. • Supervise animal movement. • Supervise sward assessment. • Supervise botanical assessment. • Supervise water provision. • Supervise oversowing. • Review record sheet.	Paddocks, animals. Movable electric fence. Sward stick. Step-point frame. Water trough, brush, water. Compost, legume seed. Record sheets, logbook.

				oversow with legume seed. • Complete pasture record sheet.		
GENERAL OBJECTIVE 4.0: Carry out daily husbandry routines for cattle in organic systems.						
5-6				• Release cattle from night kraal to pasture; head count. • Water trough cleaning and refill. • Feed supplementary forage (cut Pennisetum, Centrosema) to working bull. • Perform Low-stress handling; approach, halter and lead one cow. • Perform Body condition scoring on 5 cattle • Observe cows for oestrus • Assist with hoof trimming on one cow. • Wash udder, milk by hand, strain, cool. • Perfom head count, return to kraal, check for missing. • Weigh cattle (weigh-band)	Guide students to: • Release cattle from night kraal to pasture; head count. • Water trough cleaning and refill. • Feed supplementary forage (cut Pennisetum, Centrosema) to working bull. • Perform Low-stress handling; approach, halter and lead one cow. • Perform Body condition scoring on 5 cattle • Observe cows for oestrus • Assist with hoof trimming on one cow. • Wash udder, milk by hand, strain, cool. • Perfom head count, return to kraal, check for missing. • Weigh cattle (weigh-band) and record.	Cattle herd, kraal, pasture. Halter, lead rope, water trough. Forage cut. BCS chart, weigh band. Hoof-trimming tools. Milking pails, sieve. Cleaning equipment. Record sheets.

				and record. • Clean and disinfect milking area. • Complete daily cattle record sheet.	• Clean and disinfect milking area. • Complete daily cattle record sheet.	
GENERAL OBJECTIVE 5.0: Carry out daily routines for small ruminants (sheep and goats) in organic systems.						
7-8				• Release from night shelter; head count and observe for sick animals. • Provide water and supplement forage • Catch, restrain, examine one sheep and one goat. • Carry out dentition to determine age on 5 small ruminants. • Perform body condition scoring on 5 small ruminants • Perfom Hoof trimming on 2 small ruminants. • Conduct Vaccination using PPR / anthrax vaccine (organic-permitted) on 5 animals. • Identify pregnant females by abdominal palpation • Assist in parturition.	Guide students to: • Release from night shelter; head count and observe for sick animals. • Provide water and supplement forage • Catch, restrain, examine one sheep and one goat. • Carry out dentition to determine age on 5 small ruminants. • Perform body condition scoring on 5 small ruminants • Perfom Hoof trimming on 2 small ruminants. • Conduct Vaccination using PPR / anthrax vaccine (organic-permitted) on 5 animals. • Identify pregnant females by abdominal palpation • Assist in parturition.	Small ruminants, shelter, pasture. Water, forage. Handling tools. Mouth gag, dentition chart. BCS chart, weigh scale. Hoof-trimming tools. Vaccines, syringes, cooler. Birthing kit, tags. Record sheets.

				• Process kids/lambs — navel disinfection, colostrum check, ID tagging. • Weigh small ruminants; record. • Clean shelter and remove manure for composting. • Complete daily small-ruminant record sheet.	• Process kids/lambs — navel disinfection, colostrum check, ID tagging. • Weigh small ruminants; record. • Clean shelter and remove manure for composting. • Complete daily small-ruminant record sheet.	
GENERAL OBJECTIVE 6.0: Perform Poultry husbandry under free-range and semi-intensive organic systems.						
9-10				• Open coop, • Release to range • Carry out head count. • Provide clean water and supplementary organic-feed • Collect eggs; clean, weigh, candle for fertility (if breeding flock). • Examine birds for signs of ill-health (eyes, feathers, droppings). • Vaccinate birds against infectious diseases (organic-permitted) via drinking water or eye-drop.	Guide students to: • Open coop, • Release to range • Carry out head count. • Provide clean water and supplementary organic-feed • Collect eggs; clean, weigh, candle for fertility (if breeding flock). • Examine birds for signs of ill-health (eyes, feathers, droppings). • Vaccinate birds against infectious diseases (organic-permitted) via drinking water or eye-drop. • Identify broody hens;	Native chickens, coops, range. Water, organic feed. Egg trays, candling lamp. vaccine, droppers. Brooding area, heat lamp. Litter material. Mobile chicken tractor. Weigh scale. Processing kit. Record sheets, PPE.

				• Identify broody hens; manage broodiness. • Brood newly-hatched chicks under heat lamp (or hen). • Clean coop, replace litter, compost old litter. • Move mobile chicken tractor to fresh pasture; secure perimeter. • Weigh sample birds; record growth. • Process spent hens (with supervision). • Complete daily poultry record sheet.	manage broodiness. • Brood newly-hatched chicks under heat lamp (or hen). • Clean coop, replace litter, compost old litter. • Move mobile chicken tractor to fresh pasture; secure perimeter. • Weigh sample birds; record growth. • Process spent hens (with supervision). • Complete daily poultry record sheet.	
GENERAL OBJECTIVE 7.0 **Conduct daily routine practices for micro livestock in organic systems**						
11				• Release to range; • Carry out head count, • Check bee hives • Provide clean water and supplementary organic-feed. • Examine animals for signs of ill-health (eyes, skin, droppings). • Vaccinate animals against	Guide students to: • Release to range; • Carry out head count, • Check bee hives • Provide clean water and supplementary organic-feed. • Examine animals for signs of ill-health (eyes, skin, droppings). • Vaccinate animals against	cage, range. Water, organic feed. vaccine, bee hives, Intensive care area, Bedding material. animal tractor. Weigh scale. Processing kit.

				infectious diseases (organic-permitted) • Take care of newly-born animals • Clean cage, • Replace litter, • Compost old litter. • Move animals to fresh pasture; • Secure perimeter. • Weigh sample animals; record growth. • Cull old or unproductive animals (with supervision). • Complete daily record sheet.	infectious diseases (organic-permitted) • Take care of newly-born animals • Clean cage, • Replace litter, • Compost old litter. • Move animals to fresh pasture; • Secure perimeter. • Weigh sample animals; record growth. • Cull old or unproductive animals (with supervision). • Complete daily record sheet.	Record sheets, PPE.
GENERAL OBJECTIVE 8.0: Demonstrate organic feeding practices forage harvesting, residue use, organic ration mixing.						
12				• Cut and bundle forage using sickle or brush cutter. • Chop forage in mechanical chopper for ruminants. • Feed mixed grass-legume forage to cattle/sheep/goat; • Observe consumption. • Process crop residue.	Guide students to: • Cut and bundle forage using sickle or brush cutter. • Chop forage in mechanical chopper for ruminants. • Feed mixed grass-legume forage to cattle/sheep/goat; • Observe consumption. • Process crop residue: chop	Forage, sickle, chopper. Test animals. Feed ingredients, mixer, scale. Urea, molasses, salt. Water testing tools. Record sheets,

				• Chop maize stover or cassava peel. • Mix small batch of organic compliant chicken starter feed using organic ingredients • Feed mixed ration to layer flock • Prepare urea-molasses-multinutrient block (with organic compliance). • Measure feed intake • Check water quality check • Complete feeding record sheet.	maize stover or cassava peel. • Mix small batch of organic compliant chicken starter feed using organic ingredients • Feed mixed ration to layer flock • Prepare urea-molasses-multinutrient block (with organic compliance). • Measure feed intake • Check water quality check • Complete feeding record sheet.	PPE.
GENERAL OBJECTIVE 9.0: Demonstrate animal welfare assessment using the Five Domains framework.						
13-14				• Conduct full Five Domains assessment on cattle herd (Nutrition, Environment, Health, Behaviour, Mental State). • Conduct same on small-ruminant flock. • Conduct same on poultry flock. • Conduct same on micro livestock • Identify welfare gaps and	Guide students to: • Conduct full Five Domains assessment on cattle herd (Nutrition, Environment, Health, Behaviour, Mental State). • Conduct same on small-ruminant flock. • Conduct same on poultry flock. • Conduct same on micro livestock	Five Domains checklists. Animal units. Report template. Discussion guide. Logbook.

				propose improvements per IFOAM/NOAN. • Compile complete Five Domains audit report on one animal unit.	• Identify welfare gaps and propose improvements per IFOAM/NOAN. • Compile complete Five Domains audit report on one animal unit.	
GENERAL OBJECTIVE 10.0: Keep records of organic animal production systems for certification and NSO compliance.						
15				• Complete the following organic farm records: animal identification register; feed log; veterinary treatment log; mortality log; production log; sales log; mating/breeding log; manure & compost log; visitor log. • Use a mobile app for record keeping • File records in dedicated folders (paper) and/or spreadsheet (digital). • Generate a summary report from the week's records.	Guide students to: • Complete the following organic farm records: animal identification register; feed log; veterinary treatment log; mortality log; production log; sales log; mating/breeding log; manure & compost log; visitor log. • Use a mobile app for record keeping • File records in dedicated folders (paper) and/or spreadsheet (digital). • Generate a summary report from the week's records.	All record forms. Filing folders. Computer with spreadsheet. Audit checklist. Final submission rubric. Gadgets Logbooks completed.
COURSE ASSESSMENT: Course Assessment (Practical Based):10%						

Practical:	50%
Examination (Practical Based):	40%
Total:	**100%**

COMPUTER APPLICATIONS IN ORGANIC FARMING

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: COMPUTER APPLICATIONS IN ORGANIC FARMING	**COURSE CODE: OAP 318**	**CONTACT HOURS: 2 HOURS/WEEK**
	CREDIT UNIT: 2	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 1 HOUR/WEEK**
GOAL: This course is designed to equip students with knowledge and skills of digital tools in organic livestock enterprise.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the role of ICT and digital tools in organic farming and organic certification; 2.0 Demonstrate basic computer literacy; 3.0 Know word-processing software to produce organic farm reports, certification documents and proposals; 4.0 Know spreadsheet software for farm records, basic data analysis and ration formulation; 5.0 Know database concepts and tools for managing the organic certification audit trail; 6.0 Know internet, email, cloud storage and online collaboration tools effectively; 7.0 Know farm management software (FMS) adapted for organic livestock production; 8.0 Know GIS, remote sensing and mobile-app tools for organic farm mapping and management; 9.0 Know social media, e-commerce and digital marketing platforms for organic livestock products.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: COMPUTER APPLICATIONS IN ORGANIC FARMING	COURSE CODE: OAP 318	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 1 HOUR/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills of digital tools in organic livestock enterprise.		
GENERAL OBJECTIVE 1.0: Understand the role of ICT and digital tools in organic farming and organic certification.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define ICT (Information and Communication Technology) and its branches. 1.2 Describe the role of ICT in modern Organic Animal Husbandry 1.3 Explain ICT-specific roles in Organic Animal Husbandry 1.4 Describe IFOAM/NOAN	• Explain ICT. • Explain ICT in agriculture. • Explain ICT in organic. • Explain IFOAM documentation. • Explain digital divide. • Explain ethics. • Explain entrepreneurship in Organic Animal Husbandry	Whiteboard, Projector. IFOAM documentation guidelines. Textbooks. Internet access.	• Tour the institution computer/ICT laboratory. • Identify ICT use in Nigerian Livestock farms — what works, what doesn't. • Identify ICT tools currently used by Nigerian organic farmers (online research). • Map the data flow	Guide students to; • Tour the institution computer/ICT laboratory. • Identify ICT use in Nigerian Livestock farms — what works, what doesn't. • Identify ICT tools currently used by Nigerian organic farmers (online research).	Computer lab. Discussion prompts. Internet access. Data-flow mapping template.

	documentation requirements 1.5 Describe the digital divide in Nigerian Organic Animal Husbandry and strategies to bridge it. 1.6 Explain ethical considerations intellectual property, AI ethics. 1.7 Describe entrepreneurial opportunities in Organic Animal Husbandry			on an organic livestock farm — from animal to certificate.	• Map the data flow on an organic livestock farm from animal to certificate.	
GENERAL OBJECTIVE 2.0: Demonstrate basic computer literacy.						
2	2.1 Describe computer components 2.2 Describe operating systems 2.3 Describe Windows fundamentals 2.4 Describe file management 2.5 Describe data storage 2.6 Describe computer security	• Explain computer components • Explain operating systems • Explain Windows fundamentals • Explain file management • Discuss data storage • Explain computer security	Projector, whiteboard. Textbooks. Internet access. Marker	• Turn on / shut down computer correctly. • Practise mouse and keyboard skills with typing tutor. • Create folder, save, copy, move, rename and delete files. • Connect and use a	Guide students to; • Turn on / shut down computer correctly. • Practise mouse and keyboard skills with typing tutor. • Create folder, save, copy, move, rename and delete files.	Computers (one per student or pair). Typing tutor software. USB drives. Printer, paper. Internet access.

	2.7 Describe peripheral devices 2.8 Describe troubleshooting basics.	• Explain peripheral devices • Explain troubleshooting basics.		USB drive; back up files. • Set up a strong password and enable two-factor authentication on email. • Connect to a printer; print a test document. • Practice troubleshooting common issues (frozen screen, no internet, missing files).	• Connect and use a USB drive; back up files. • Set up a strong password and enable two-factor authentication on email. • Connect to a printer; print a test document. • Practice troubleshooting common issues (frozen screen, no internet, missing files).	PPE for ICT lab.
GENERAL OBJECTIVE 3.0: Know word-processing software to produce organic farm reports, certification documents and proposals.						
3-4	3.1 Describe word processors. 3.2 Describe the Word interface 3.3 Describe text formatting 3.4 Describe paragraph formatting 3.5 Describe page formatting	• Explain word processors. • Discuss the Word interface • Explain text formatting • Explain paragraph formatting • Explain page formatting • Explain styles and	Computer with Microsoft office/ Google Docs. Projector for demonstration. Reference textbooks. Sample documents.	• Create a new document; • Apply text formatting, fonts, styles. • Format a 3-column 5-row table of organic livestock records. • Apply page	Guide students to; • Create a new document. • Apply text formatting, fonts, styles. • Insert and format a 3-column 5-row table of organic livestock records.	Computers with Microsoft office/Docs. Sample data, photos. Treatment log template. Capstone rubric.

	3.6 Describe styles and themes for consistent formatting. 3.7 Describe images and shapes 3.8 Describe references and citations of contents. 3.9 Describe collaboration features 3.10 Describe templates for organic farm documents 3.11 Describe accessibility	themes for consistent formatting. • Describe images and shapes • Explain references and citations of contents. • Explain collaboration features • Explain templates for organic farm documents • Describe accessibility		formatting: A4 portrait, 2.5 cm margins, header with farm name, footer with page number. • Format a chart and image (e.g. farm photo) with caption. • Create a 3-page organic farm report using styles and table of contents. • Use track changes and add comments to a colleague's document. • Create from scratch a treatment log template (date, animal ID, condition, treatment, dose, withdrawal). • Print a completed report.	• Apply page formatting: A4 portrait, 2.5 cm margins, header with farm name, footer with page number. • Insert and format a chart and image (e.g. farm photo) with caption. • Create a 3-page organic farm report using styles and table of contents. • Use track changes and add comments to a colleague's document. • Create from scratch a treatment log template (date, animal ID, condition, treatment, dose, withdrawal). • Print completed report.	Printer, email access.

GENERAL OBJECTIVE 4.0: Know spreadsheet software for farm records, basic data analysis and ration formulation.						
5-6	4.1 Describe spreadsheet software 4.2 Explain the spreadsheet interface 4.3 Explain data entry and cell formats 4.4 Describe basic formulas 4.5 Explain absolute vs relative cell references; $ symbol. 4.6 Explain charting. 4.7 Describe data validation 4.8 Explain sorting and filtering. 4.9 Describe pivot tables for summarising large datasets. 4.10 Describe conditional formatting. 4.11 Describe protecting cells and worksheets. 4.12 Describe collaboration in Google Sheets.	• Explain software. • Explain interface. • Explain data entry. • Explain formulas. • Explain references. • Explain charting. • Explain data validation. • Explain sorting/filtering. • Explain pivot tables. • Explain formatting. • Explain protection. • Discuss collaboration. • Discuss ration formulation. • Discuss organic spreadsheets.	Projector for demonstration. Sample data files. Reference textbooks.	• Create a daily egg-production log for 100 layer flock: date, eggs collected, broken, dirty, % production. • Apply advance excel formulas to the log. • Create a bar chart of weekly egg production. • Build a feed conversion ratio (FCR) calculator: feed consumed / weight gain. • Build an organic ration formulator using Pearson Square for a chicken starter feed. • Use Solver for least-cost organic ration formulation (CP target, lysine target).	Guide students to; • Create a daily egg-production log for 100 layer flock: date, eggs collected, broken, dirty, % production. • Apply advance excel formulas to the log. • Create a bar chart of weekly egg production. • Build a feed conversion ratio (FCR) calculator: feed consumed / weight gain. • Build an organic ration formulator using Pearson Square for a chicken starter feed. • Use Solver for least-cost organic ration formulation (CP target, lysine	Computers with Excel / Sheets. Sample farm data. Ration formulation worksheet. Capstone rubric. Internet for sheets.

	4.13 Describe ration formulation in spreadsheets 4.14 Describe specific organic farm spreadsheets			• Create a pivot table summarising costs by category from sample farm financial data. • Set up data validation drop-downs for animal species, condition, treatment. • Collaborate on a shared Google Sheet with 3 classmates. • Build a complete organic farm record-keeping workbook with 8 linked worksheets.	target). • Create a pivot table summarising costs by category from sample farm financial data. • Set up data validation drop-downs for animal species, condition, treatment. • Collaborate on a shared Google Sheet with 3 classmates. • Build a complete organic farm record-keeping workbook with 8 linked worksheets.	
GENERAL OBJECTIVE 5.0: Know database concepts and tools for managing the organic certification audit trail.						
7	5.1 Define database 5.2 Explain relational database concepts 5.3 Describe database management systems (DBMS) 5.4 Explain database	• Explain database. • Explain relational concepts. • Explain DBMS. • Explain database design. • Explain SQL basics.	Sample database files. Projector. Reference textbooks.	• Create a 4-table relational database in Airtable: Farms, Animals, Feed Batches, Treatments. • Define primary	Guide students to; • Create a 4-table relational database in Airtable: Farms, Animals, Feed Batches, Treatments.	Computers, Airtable account (free). Sample data, scenario. Backup

	design 5.5 Describe SQL basics. 5.6 Describe forms, queries, reports. 5.7 Explain organic-certification database structure 5.8 Describe traceability via database 5.9 Explain data backup and security. 5.10 Describe cloud-based no-code databases	• Explain forms/queries/reports. • Explain certification database. • Explain traceability. • Discuss security. • Explain no-code databases.		and foreign keys; establish relationships. • Enter sample data for 10 animals, 5 feed batches, 10 treatments. • Run a query: "Find all animals receiving treatment X in last 30 days." • Generate a report of organic-compliant animals. • Trace one product through database. • Practice database backup and restore. • Design a database for the institutional organic farm.	• Define primary and foreign keys; establish relationships. • Enter sample data for 10 animals, 5 feed batches, 10 treatments. • Run a query: "Find all animals receiving treatment X in last 30 days." • Generate a report of organic-compliant animals. • Trace one product through database. • Practice database backup and restore. • Design a database for the institutional organic farm.	media. Database design template.
GENERAL OBJECTIVE 6.0: Know internet, email, cloud storage and online collaboration tools effectively.						
8-9	6.1 Describe internet basics 6.2 Explain effective search strategies	• Explain internet basics. • Explain search strategies.	Projector for demonstration. Sample emails, links.	• Conduct search on Google Scholar for "organic poultry production in	Guide students to; • Conduct search on Google Scholar for "organic poultry	Computers, internet. Email accounts.

	6.3 Explain identifying credible sources IFOAM/FAO sites. 6.4 Describe email 6.5 Describe cloud storage, 6.6 Explain collaboration tools 6.7 Describe video conferencing 6.8 Describe online learning resources for organic agriculture 6.9 Describe online communities of practice 6.10 Describe cybersecurity awareness.	• Explain credible sources. • Explain email. • Explain cloud storage. • Explain collaboration tools. • Explain video conferencing. • Explain online learning. • Explain communities. • Explain cybersecurity.	Reference materials.	Nigeria"; identify 5 credible sources. • Create an email signature for a professional context. • Compose, attach and send 3 professional emails (request, follow-up, sharing). • Upload an organic-farm document to Google Drive; share with specific permissions. • Collaborate on a shared Google Doc with 4 classmates. • Host a 15-minute Zoom meeting with screen sharing. • Enroll in a relevant free FAO/IFOAM online course; complete first module. • Join NOAN online	production in Nigeria"; identify 5 credible sources. • Create an email signature for a professional context. • Compose, attach and send 3 professional emails (request, follow-up, sharing). • Upload an organic-farm document to Google Drive; share with specific permissions. • Collaborate on a shared Google Doc with 4 classmates. • Host a 15-minute Zoom meeting with screen sharing. • Enroll in a relevant free FAO/IFOAM online course; complete first module.	Cloud storage accounts. Zoom accounts. NOAN community link. Sample phishing emails.

				community; introduce self. • Identify a phishing email (training exercise).	• Join NOAN online community; introduce self. • Identify a phishing email (training exercise).	
GENERAL OBJECTIVE 7.0: Know farm management software (FMS) adapted for organic livestock production.						
10-11	7.1 Explain farm management software (FMS) 7.2 Explain major commercial FMS 7.3 Describe African/Nigerian FMS 7.4 Explain IFOAM 7.5 Explain core FMS modules 7.6 Describe data input methods 7.7 Describe data export and integration with certification audits. 7.8 Explain cost-benefit of FMS adoption for smallholders vs large farms. 7.9 Describe open-source	• Explain farm management software (FMS) • Explain major commercial FMS • Describe African/Nigerian FMS • Explain IFOAM • Explain core FMS modules • Describe data input methods • Describe data export and integration with certification audits. • Explain cost-benefit of FMS adoption for smallholders vs large farms. • Describe open-source / free FMS for	Whiteboard, Textbook Projector Marker Computer Internet.	• Sign up for a free trial of an FMS (Farmbrite, Airtable template, or similar). • Set up a farm profile and add 5 animals with details. • Record feed transactions and treatments for 1 week. • Generate an audit-trail report. • Export data as CSV for further analysis. • Compare 3 different FMS for an organic-specific use case; recommend one.	Guide students to; • Sign up for a free trial of an FMS (Farmbrite, Airtable template, or similar). • Set up a farm profile and add 5 animals with details. • Record feed transactions and treatments for 1 week. • Generate an audit-trail report. • Export data as CSV for further analysis. • Compare 3 different FMS for an organic-specific use case;	Computers, internet. FMS accounts. Sample animal data. Comparison matrix. AI demo (smartphone app).

	/ free FMS for smallholders 7.10 Describe artificial intelligence in FMS 7.11 Describe ethical and privacy considerations.	smallholders • Describe artificial intelligence in FMS • Describe ethical and privacy considerations.		• Assess the institutional organic farm's current record-keeping vs digital alternatives. •	recommend one. • Assess the institutional organic farm's current record-keeping vs digital alternatives.	
GENERAL OBJECTIVE 8.0: Know GIS, remote sensing and mobile-app tools for organic farm mapping and management.						
12-13	8.1 Define GIS (Geographic Information System) and its components 8.2 Explain GIS applications in organic farming 8.3 Describe GIS software 8.4 Explain spatial data types 8.5 Describe coordinate 8.6 Describe GPS use 8.7 Explain remote sensing 8.8 Explain NDVI (Normalised Difference Vegetation Index) for pasture monitoring.	• Explain GIS. • Discuss applications. • Explain software. • Explain spatial data. • Discuss coordinate systems. • Explain GPS. • Discuss remote sensing. • Explain NDVI. • Explain Nigerian satellites. • Explain mobile apps. • Explain weather apps. • Discuss data-collection tools.	Computers with QGIS / Google Earth Pro. Smartphones with GPS. Drone (if available). Sample shapefiles. Mobile-app installations. Projector.	• Use Google Earth Pro to view satellite imagery of the institutional farm. • Use GPS on smartphone to record waypoints at 5 farm features. • Open QGIS; import GPS waypoints; create a farm boundary polygon. • Calculate area of farm in hectares. • Map paddocks and animal housing as polygons. • Add labels and create a thematic map for printing.	Guide students to; • Use Google Earth Pro to view satellite imagery of the institutional farm. • Use GPS on smartphone to record waypoints at 5 farm features. • Open QGIS; import GPS waypoints; create a farm boundary polygon. • Calculate area of farm in hectares. • Map paddocks and animal housing as polygons. • Add labels and create a thematic	Computers with QGIS. Smartphones, internet. GPS receivers. Drone (optional). Sample shapefiles. KoBoToolbox account. Printer for map. Capstone rubric.

	8.9 Describe Nigerian agriculture-relevant satellite resources 8.10 Describe agricultural mobile apps 8.11 Describe weather and climate apps 8.12 Describe field-data collection tools			• Use NDVI viewer (Sentinel Hub or similar) to assess pasture greenness over time. • Use KoBoToolbox to design a digital field-data collection form for organic farm visits. • Conduct a field survey using the form on smartphone; export data. • Produce a 1-page farm map with paddocks, infrastructure and biosecurity zones using QGIS.	map for printing. • Use NDVI viewer (Sentinel Hub or similar) to assess pasture greenness over time. • Use KoBoToolbox to design a digital field-data collection form for organic farm visits. • Conduct a field survey using the form on smartphone; export data. • Produce a 1-page farm map with paddocks, infrastructure and biosecurity zones using QGIS.	
GENERAL OBJECTIVE 9.0: Know social media, e-commerce and digital marketing platforms for organic livestock products.						
14-15	9.1 Describe social media platforms relevant to organic agribusiness 9.2 Explain creating a professional organic	• Discuss social media platforms. • Discuss brand creation. • Explain content	Whiteboard, Projector Computer Marker Textbook.	• Set up a professional LinkedIn profile as an HND OAP graduate. • Create an Instagram	Guide students to; • Set up a professional LinkedIn profile as an HND OAP graduate.	Computers, smartphones, internet. LinkedIn, Instagram,

	farm brand on social media 9.3 Explain content creation 9.4 Describe Canva for non-designers 9.5 Describe e-commerce 9.6 Describe payment systems 9.7 Describe order fulfilment 9.8 Explain digital marketing 9.9 Describe analytics 9.10 Describe storytelling for organic brand 9.11 Explain customer relationship management (CRM) tools 9.12 Describe digital marketing ethics 8.13 Describe entrepreneurship opportunities	creation. • Explain Canva. • Explain e-commerce. • Explain payment systems. • Explain order fulfilment. • Discuss digital marketing. • Explain analytics. • Explain storytelling. • Explain CRM. • Explain ethics. • Explain entrepreneurship.		or Facebook page for a hypothetical Nigerian organic farm. • Take and edit 5 photos of the institutional farm; caption with organic story. • Create a short 60-second video tour of the organic farm using smartphone. • Design 3 social-media graphics in Canva (logo, infographic on organic principles, product flyer). • Sign up for a Paystack account and explore payment flow (test mode). • Set up a simple e-commerce listing on a chosen platform. • Draft an email marketing campaign for an organic egg	• Create an Instagram or Facebook page for a hypothetical Nigerian organic farm. • Take and edit 5 photos of the institutional farm; caption with organic story. • Create a short 60-second video tour of the organic farm using smartphone. • Design 3 social-media graphics in Canva (logo, infographic on organic principles, product flyer). • Sign up for a Paystack account and explore payment flow (test mode). • Set up a simple e-commerce listing on a chosen platform. • Draft an email marketing campaign	Facebook accounts. Canva, Paystack accounts. Photo and video editing software. Marketing plan template. Projector, presentation board.

				subscription. • design a complete digital marketing plan for a real or hypothetical Nigerian organic livestock enterprise. • Capstone group presentation: "Digital Tools for the HND OAP Graduate."	for an organic egg subscription. • design a complete digital marketing plan for a real or hypothetical Nigerian organic livestock enterprise. Capstone group presentation: "Digital Tools for the HND OAP Graduate."	

COURSE ASSESSMENT:

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

YEAR I SEMESTER II

ORGANIC STANDARDS AND CERTIFICATION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC STANDARDS AND CERTIFICATION	**COURSE CODE: OAP 321**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: OAP 311**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with Knowledge and skills in Organic Animal Standards and Certification.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the organic global landscape and the IFOAM Standards; 2.0 Know the NOAN Standard (Nigeria) and other African organic standards; 3.0 Know the USDA National Organic Program (NOP) requirements; 4.0 Know the EU 2018/848 Organic Regulation requirements; 5.0 Know the organic certification process; 6.0 Operate Internal Control Systems (ICS) for group certification of smallholder farmers; 7.0 Understand permitted and prohibited inputs, conversion period and labelling/traceability requirements; 8.0 Understand equivalency agreements, AfCFTA organic trade, halal-organic synergy and entrepreneurial roles.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC STANDARDS AND CERTIFICATION	COURSE CODE: OAP 321	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: OAP 311	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with Knowledge and skills in Organic Animal Production.		
GENERAL OBJECTIVE 1.0: Understand the organic global landscape and the IFOAM Family Standards.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Describe the global organic certification ecosystem 1.2 Describe the IFOAM Family of Standards 1.3 Describe IFOAM Norms 1.4 Describe the IFOAM Accreditation Programme (administered by IOAS 1.5 Describe major standards globally	• Explain the global organic certification ecosystem • Explain the IFOAM Family of Standards • Explain IFOAM Norms • Explain the IFOAM Accreditation Programme (administered by IOAS • Explain major standards globally	IFOAM Norms document. IFOAM Standards list. Codex organic guidelines. Reference textbooks. Projector, whiteboard, internet.	• Review IFOAM Family Standards list and identify which standards apply to which markets. • Build a comparison matrix of 6 major standards across 10 criteria. • Visit IFOAM website (ifoam.bio) and download the	Guide students to; • Review IFOAM Family Standards list and identify which standards apply to which markets. • Build a comparison matrix of 6 major standards across 10 criteria. • Visit IFOAM website (ifoam.bio) and download the	Computer with internet. Comparison template. website access. Standard selection scenarios. Webinar recording.

	1.6 Describe National Standards in Africa 1.7 Describe Participatory Guarantee Systems (PGS) 1.8 Describe Codex Alimentarius Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods. 1.9 Describe the 4 IFOAM Principles (revisit OAP 311) as the foundation of all standards.	• Explain National Standards in Africa • Explain Participatory Guarantee Systems (PGS) • Explain Codex Alimentarius Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods. • Explain the 4 IFOAM Principles (revisit OAP 311) as the foundation of all standards		IFOAM Norms; • Locate the animal-husbandry section. • Identify the standard most relevant for a Nigerian organic-product exporter targeting EU consumers and USA consumers. • Watch a recorded webinar on global organic certification trends.	IFOAM Norms; • Locate the animal-husbandry section. • Identify the standard most relevant for a Nigerian organic-product exporter targeting EU consumers and USA consumers. • Watch a recorded webinar on global organic certification trends.	
GENERAL OBJECTIVE 2.0: Know the NOAN Standard (Nigeria) and other African organic standards.						
2-3	2.1 Describe the Nigerian Organic Agriculture Network (NOAN) 2.2 Describe the NOAN Standard development 2.3 Describe NOAN Standard structure 2.4 Describe NOAN Standard animal-husbandry requirements	• Explain NOAN. • Explain NOAN Standard development. • Explain NOAN Standard structure. • Explain NOAN animal husbandry. • Explain NOAN-affiliated CBs.	NOAN Standard document. EOA Initiative materials. Projector, whiteboard.	• Read the NOAN Standard animal-husbandry chapter; summarise the 8 key requirements. • Review NOAN inspector qualifications and process. • Visit (in-person or	Guide students to; • Read the NOAN Standard animal-husbandry chapter; summarise the 8 key requirements. • Review NOAN inspector qualifications and process.	NOAN Standard document. Interview guide. Transport for NOAN visit. Comparison template.

	2.5 Describe NOAN-affiliated certification bodies 2.6 Describe NOAN inspector training and accreditation. 2.7 Describe NAFDAC organic guidelines and the developing Nigerian National Organic Regulation. 2.8 Describe the East African Organic Products Standard 2.9 Describe NOGAMU (Uganda), KOAN (Kenya), TOAM (Tanzania), Senegal Federation of Organic Producers (FENAB). 2.10 Describe the African Union's Ecological Organic Agriculture (EOA) Initiative and its 9-country implementation. 2.11 Describe the AU's vision for	• Explain inspector training. • Explain NAFDAC guidelines. • Explain East African Standard. • Explain other African standards. • Explain EOA Initiative. • Explain AU vision.		virtual) NOAN office; interview a NOAN officer. • Identify Nigerian farms currently NOAN-certified or in transition. • Compare NOAN with East African Organic Products Standard for animal husbandry. • Visit a Nigerian farm with NOAN certification	• Visit (in-person or virtual) NOAN office; interview a NOAN officer. • Identify Nigerian farms currently NOAN-certified or in transition. • Compare NOAN with East African Organic Products Standard for animal husbandry. • Visit a Nigerian farm with NOAN certification	Pathway template.

	mainstreaming organic agriculture by 2025 and beyond.					
GENERAL OBJECTIVE 3.0: Know the USDA National Organic Program (NOP) requirements.						
4-5	3.1 Describe USDA NOP 3.2 Describe USDA NOP labelling tiers 3.3 Describe USDA NOP allowed/prohibited substance list. 3.4 Describe USDA NOP livestock requirements 3.5 Describe USDA NOP poultry requirements 3.6 Describe USDA NOP dairy requirements 3.7 Describe USDA NOP transition 3.8 Describe USDA-Accredited Certifying Agents (ACAs) 80 globally. 3.9 Describe USDA NOP export to USA from Nigeria 3.10 Describe USDA NOP enforcement	• Explain USDA NOP origin. • Explain USDA NOP labelling tiers. • Explain USDA NOP substance list. • Explain USDA NOP livestock requirements. • Explain USDA NOP poultry requirements. • Explain USDA NOP dairy requirements. • Explain USDA NOP transition. • Explain accredited agents. • Explain USDA NOP export to USA. • Explain USDA NOP enforcement.	7 CFR Part 205 (USDA NOP). USDA NOP handbook. National List of Substances. Sample USDA NOP labels. Projector, whiteboard.	• Navigate USDA NOP website; locate the National List of Allowed and Prohibited Substances. • Compare USDA NOP labelling tiers against NOAN labelling. • Identify USDA NOP-compliant inputs for a Nigerian organic poultry operation. • Assess whether 5 common Nigerian inputs would be USDA-permitted. • Prepare a Nigerian organic-honey producer for USDA NOP certification — outline 12 critical steps.	Guide students to; • Navigate USDA NOP website; locate the National List of Allowed and Prohibited Substances. • Compare USDA NOP labelling tiers against NOAN labelling. • Identify USDA NOP-compliant inputs for a Nigerian organic poultry operation. • Assess whether 5 common Nigerian inputs would be USDA-permitted. • Prepare a Nigerian organic-honey producer for USDA NOP certification — outline 12 critical steps.	Computer with internet. USDA NOP documents. Input lists. Comparison templates. Preparation scenarios.

GENERAL OBJECTIVE 4.0: Know the EU 2018/848 Organic Regulation requirements.						
6-7	4.1 Describe EU Regulation 2018/848 4.2 Describe EU 2018/848 scope 4.3 Describe EU livestock requirements 4.4 Describe EU-specific animal welfare requirements 4.5 Describe EU transition periods 4.6 Explain EU labelling 4.7 Explain EU import requirements from Nigeria 4.8 Describe EU group certification rules 4.9 Describe EU control system 4.10 Describe equivalency vs compliance. 4.11 Describe TRACES NT (Trade Control and Expert System)	• Explain EU 2018/848 and its Scope • Explain livestock requirements. • Explain welfare requirements. • Explain transition periods. • Explain labelling. • Explain Nigeria import. • Explain group certification. • Explain control system. • Explain equivalency. • Explain TRACES NT.	EU 2018/848 regulation. EU Organic logo guide. TRACES NT user guide. Reference materials. Projector, whiteboard.	• Read selected sections of EU 2018/848 on livestock (Annex II Part II); • Summarise key requirements. • Identify which EU-recognised certification body operates in Nigeria. • Complete a TRACES NT mock import certificate. • Prepare a EU-export readiness plan for a hypothetical Nigerian organic-poultry exporter. • Identify gaps between current Nigerian practice and EU welfare requirements.	Guide students to; • Read selected sections of EU 2018/848 on livestock (Annex II Part II); • Summarise key requirements. • Identify which EU-recognised certification body operates in Nigeria. • Complete a TRACES NT mock import certificate. • Prepare a EU-export readiness plan for a hypothetical Nigerian organic-poultry exporter. • Identify gaps between current Nigerian practice and EU welfare requirements.	EU 2018/848 document. TRACES NT access. Readiness plan template. Gap assessment template.
GENERAL OBJECTIVE 5.0: Know the organic certification process						

8-9	5. 1Describe the typical organic certification process 5. 2Describe Phase 1 Preparation 5. 3Describe Phase 2 Application 5. 4Describe Phase 3 Organic System Plan (OSP) 5. 5Describe Phase 4 Osp Review 5. 6Describe Phase 5 ON-Site inspection 5. 7Describe Phase 6 Inspection Report 5. 8Describe Phase 7 Certification Decision 5. 9Describe Phase 8 Surveillance & Recertification 5. 10 Describe Internal Control System (ICS) for group certification 5. 11 Describe documentation requirements 5. 12 Describe what to do during an inspection	• Explain organic certification process. • Explain Phase 1 Preparation. • Explain Phase 2 Application. • Explain Phase 3 OSP. • Explain Phase 4 OSP Review. • Explain Phase 5 Inspection. • Explain Phase 6 Report. • Explain Phase 7 Decision. • Explain Phase 8 Surveillance. • Explain ICS. • Explain documentation. • Explain inspection conduct. • Explain non-conformance handling.	Sample OSPs, application forms, inspection reports. Certification body materials. Reference textbooks. Projector, whiteboard Marker.	• complete a comprehensive OSP for a hypothetical organic mixed-livestock farm (cattle, poultry, honey, vegetables). • Prepare an inspection-readiness checklist for the institution farm. • Conduct a mock inspection on the institution farm with classmate as inspector. • Prepare inspection report from the mock inspection; identify non-conformances; develop CAP. • Role-play: certification decision committee deliberation on the mock case.	Guide students to; • Complete a comprehensive OSP for a hypothetical organic mixed-livestock farm (cattle, poultry, honey, vegetables). • Prepare an inspection-readiness checklist for the institution farm. • Conduct a mock inspection on the institution farm with classmate as inspector. • Prepare inspection report from the mock inspection; identify non-conformances; develop CAP. • Role-play: certification decision committee deliberation on the mock case. • Develop a comprehensive	OSP template. Inspection checklist. Mock inspection materials. Report template, CAP template. Decision scenarios. Retention schedule template. Surveillance calendar.

	5. 13 Describe handling non-conformances			• Develop a comprehensive document retention schedule.	document retention schedule.	
GENERAL OBJECTIVE 6.0: Design and operate Internal Control Systems (ICS) for group certification of smallholder farmers.						
10-11	6.1 Explain group certification benefits 6.2 Describe ICS as a quality management system operated by the producer group. 6.3 Describe ICS components in detail: ✓ Internal regulations ✓ Internal inspectors ✓ Internal inspection ✓ Approval committee ✓ Records ✓ Training 6.4 Describe ICS manager roles and qualifications. 6.5 Describe risk-based external inspection. 6.6 Describe mass balance reconciliation 6.7 Describe farmer-	• Explain group certification benefits • Explain ICS as a quality management system operated by the producer group. • Explain ICS components in detail: ✓ Internal regulations ✓ Internal inspectors ✓ Internal inspection ✓ Approval committee ✓ Records ✓ Training • Explain member registration. • Explain conflict of interest.	IFOAM Group Certification Guide. Sample ICS manuals. NOAN guidance. Reference materials. Projector, whiteboard.	• Develop a complete ICS manual for a 50-member model organic cooperative. • Develop internal inspection checklist tailored for the cooperative. • Conduct mock internal inspection in pairs. • Design ICS records template — farmer register, inspection log, sanction log. • Develop training programme for the cooperative. • Deliver a 30-minute lesson on organic feeding to	Guide students to; • Develop a complete ICS manual for a 50-member model organic cooperative. • Develop internal inspection checklist tailored for the cooperative. • Conduct mock internal inspection in pairs. • Design ICS records template — farmer register, inspection log, sanction log. • Develop training programme for the cooperative. • Deliver a 30-minute lesson on organic feeding to peers	ICS manual template. Inspection checklist. Records templates. Training materials. Transport for visit.

	member registration 6.8 Describe ICS conflict-of-interest management. 6.9 Describe ICS sanction policy and appeals. 6.10 Describe ICS training requirements 6.11 Describe ICS sustainability 6.12 Describe Nigerian and African ICS examples	• Explain sanctions/appeals. • Explain training. • Explain ICS sustainability. • Explain Nigerian ICS examples.		peers playing farmer-members. • Visit a Nigerian cooperative;	playing farmer-members. • Visit a Nigerian cooperative;	
GENERAL OBJECTIVE 7.0: Know permitted and prohibited inputs, conversion period and labelling/traceability requirements.						
12-13	7.1 Describe the general principle of organic production systems 7.2 Describe Prohibited Inputs in organic livestock 7.3 Explain Permitted Inputs in organic livestock production 7.4 Explain input verification 7.5 Describe IFOAM Norms input list, NOAN list, USDA NOP National List, EU	• Explain general principle of Organic production systems. • Explain prohibited inputs in organic livestock • Explain permitted inputs in organic livestock production • Explain input verification. • Explain IFOAM Norms input lists. • Explain input checking under a	IFOAM, NOAN, USDA NOP, EU input lists. Sample organic labels. Projector, whiteboard.	• Review IFOAM Norms input list and identify allowed and prohibited inputs. • Walk through institution farm input store; • check each input for organic compliance under NOAN. • Develop a conversion plan for a conventional farm	Guide students to; • Review IFOAM Norms input list and identify allowed and prohibited inputs. • Walk through institution farm input store; • check each input for organic compliance under NOAN. • Develop a conversion plan for a conventional farm wishing to become	Input lists. Farm input store. Conversion calculator. Label design software. Traceability template. Fraud case studies. Contamination plan template.

	Annex II. 7.6 Explain how to check whether a specific input is allowed under a given standard. 7.7 Describe Conversion Period. 7.8 Describe simultaneous conversion vs phased conversion. 7.9 Describe Labelling requirements. 7.10 Describe labelling tiers 7.11 Describe traceability requirements 7.12 Describe non-organic ingredients permitted in organic processed foods (typically up to 5 %) and their conditions. 7.13 Describe restrictions on co-mingling and contamination prevention. 7.14 Describe organic labelling fraud risk and prevention.	given standard. • Explain conversion period. • Explain conversion options. • Explain labelling. • Explain labelling tiers. • Explain traceability. • Explain non-organic ingredients. • Explain co-mingling. • Explain fraud prevention.		wishing to become organic; • Calculate timeline. • Design an organic-product label compliant with NOAN, USDA NOP and EU. • Develop a traceability system. Example; for an organic poultry farm — from chick to egg to consumer. • Investigate an organic-fraud case (e.g. recent global cases); • Identify what prevention strategies could have helped. • Develop a contamination prevention plan for an organic farm adjacent to a conventional farm.	organic; • Calculate timeline. • Design an organic-product label compliant with NOAN, USDA NOP and EU. • Develop a traceability system. Example; for an organic poultry farm — from chick to egg to consumer. • Investigate an organic-fraud case (e.g. recent global cases) • ; identify what prevention strategies could have helped. • Develop a contamination prevention plan for an organic farm adjacent to a conventional farm.	

GENERAL OBJECTIVE 8.0: Understand equivalency agreements, organic trade, halal-organic synergy and entrepreneurial roles.						
14-15	8.1 Explain Equivalency Agreements 8.2 Explain USDA-EU bilateral arrangement 8.3 Describe Codex guidelines (revisit GO 1.0). 8.4 Describe AfCFTA (African Continental Free Trade Area) opportunities for organic trade. 8.5 Explain Nigerian organic export pathways 8.6 Describe Organic Synergy 8.7 Describe halal certification bodies in Nigeria 8.8 Describe combining organic and halal certification 8.9 Describe other relevant certifications 8.10 Describe Entrepreneurial Roles in certification	• Explain equivalency agreements. • Explain USDA- EU bilateral arrangements. • Explain Codex guideline. • Explain AfCFTA. • Explain Nigerian export pathways. • Explain halal-organic synergy. • Explain halal certification bodies in Nigeria • Explain combining organic and halal certifications. • Explain other certifications. • Explain entrepreneurial roles in certification. • Discuss Nigerian institutions for certification careers.	Equivalency agreement documents. AfCFTA materials. Halal-organic comparison guide. Inspector training brochures. Projector, whiteboard.	• Map equivalency arrangements affecting Nigerian organic exports. • Produce three high-potential Nigerian organic livestock for AfCFTA export. • Visit (in-person or virtual) HQAN office; understand halal certification. • Develop a combined organic-halal certification pathway for a chicken processor. • Prepare a complete OSP for an organic livestock enterprise; submit + present. • Present a 10-minute oral presentation defending an OSP.	Guide students to; • Map equivalency arrangements affecting Nigerian organic exports. • Produce three high-potential Nigerian organic livestock for AfCFTA export. • Visit (in-person or virtual) HQAN office; understand halal certification. • Develop a combined organic-halal certification pathway for a chicken processor. • Prepare a complete OSP for an organic livestock enterprise; submit + present. • Present a 10-minute oral presentation defending an OSP.	Equivalency documents. Mapping template. Transport for visit. Combined pathway template. Career resources. Capstone OSP template. Final rubric.

	8.11 Describe Nigerian institutions for certification careers.					

COURSE ASSESSMENT:

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

ORGANIC FARM MANAGEMENT

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC FARM MANAGEMENT	**COURSE CODE: OAP 322**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills to plan, organise, direct and control an organic livestock enterprise.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the four functions of management; 2.0 Know resource management; 3.0 Know livestock production enterprise for organic livestock; 4.0 Know supply chain management for organic inputs and outputs; 5.0 Know organic-specific financial management; 6.0 Know conversion from conventional to organic livestock production; 7.0 Know marketing strategy for organic livestock products; 8.0 Understand risk management production, market, financial, regulatory in organic enterprises.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC FARM MANAGEMENT	COURSE CODE: OAP 322	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills to plan, organise, direct and control an organic livestock enterprise.		
GENERAL OBJECTIVE 1.0: Understand the four functions of management		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define management; 1.2 Describe management as both art and science. 1.3 Explain the four function of a farm manager 1.4 Describe Planning 1.5 Describe Organising 1.6 Describe Leading 1.7 Describe Controlling 1.8 Describe management	• Explain management. • Explain four functions of manager. • Explain planning. • Explain organising. • Explain leading. • Explain controlling.	Whiteboard, projector. Reference textbooks Sample organic farm case studies. Internet.	• Showcase the four management functions at work in the institutional farm. • Analyse the management challenges of a Nigerian smallholder organic farm. • Visit (in-person or virtual) a working	Guide students to; • Showcase the four management functions at work in the institutional farm. • Analyse the management challenges of a Nigerian smallholder	Institutional farm. Discussion prompts. Transport for visit. Org chart template. Comparison scenarios.

	levels 1.9 Describe management skills 1.10 Describe management in organic and conventional farms 1.11 Describe Nigerian farm management context 1.12 Describe organic farm sizes	• Explain management levels. • Explain management skills. • Discuss organic and conventional management. • Discuss the Nigerian farm management context. • Explain organic farm sizes.		organic farm; interview the manager. • Develop an organisation chart for organic mixed-livestock farm.	organic farm. • Visit (in-person or virtual) a working organic farm; interview the manager. • Develop an organisation chart for organic mixed-livestock farm.	
GENERAL OBJECTIVE 2.0: Know resource management						
2-3	2.1 Describe the four production resources 2.2 Describe Land management 2.3 Describe land tenure in Nigeria 2.4 Describe Labour management 2.5 Describe Nigerian labour considerations 2.6 Describe organic-specific labour. 2.7 Describe Capital	• Explain the four production resources • Explain Land management • Explain land tenure in Nigeria • Explain Labour management • Explain Nigerian labour considerations • Explain organic-	Sample land documents. Labour law summary. Capital budgeting templates. Textbooks. Projector, whiteboard.	• Conduct a complete resource inventory of the institution organic farm. • Develop a land-use map showing paddocks, infrastructure, buffer zones. • Develop a labour plan, eg. for a 1000-bird organic layer flock for 1 year.	Guide students to; • Conduct a complete resource inventory of the institution organic farm. • Develop a land-use map showing paddocks, infrastructure, buffer zones. • Develop a labour plan, eg. for a	Institutional farm. Land maps. Labour plan template. Capital budget template. Inventory forms. Calculator, Excel.

	management 2.8 Describe capital sources . 2.9 Describe Livestock as inventory 2.10 Describe Depreciation. 2.11 Describe equipment management 2.12 Describe resource use efficiency indicators.	specific labour. • Explain Capital management • Explain capital sources • Explain Livestock as inventory • Explain Depreciation. • Explain equipment management • Explain resource use efficiency indicators		• Develop a capital budget for starting a 10-ha organic mixed-livestock farm. • Conduct livestock inventory and valuation at the institution farm. • Compute depreciation on farm housing and equipment using straight-line method. • Compute resource use efficiency indicators for the institution farm.	1000-bird organic layer flock for 1 year. • Develop a capital budget for starting a 10-ha organic mixed-livestock farm. • Conduct livestock inventory and valuation at the institutional farm. • Compute depreciation on farm housing and equipment using straight-line method. • Compute resource use efficiency indicators for the institutional farm.	
GENERAL OBJECTIVE 3.0: Know livestock production enterprise for organic livestock						
4-5	3.1 Describe production planning. 3.2 Describe production scheduling 3.3 Describe long-term	• Explain production planning. • Explain scheduling. • Explain long-term planning (3–5	Sample production plans and schedules. Journal	• Develop an enterprise budget, e.g for a 500-bird organic layer flock. • Develop an enterprise	Guide students to; • Develop an enterprise budget, e.g for a 500-bird organic layer	Enterprise budget template. Production schedule

	planning (3–5 years) 3.4 Describe medium-term planning (1 year) 3.5 Describe short-term planning (daily, weekly, monthly) 3.6 Explain Enterprise Budgeting 3.7 Describe Enterprise Combination 3.8 Explain production schedules for specific organic enterprises 3.9 Describe GANTT chart for production planning 3.10 Explain Flock / Herd Structure planning 3.11 Describe Breeding Calendar 3.12 Describe seasonality and organic considerations 3.13 Describe contingency planning	years) • Explain medium-term planning (1 year) • Explain short-term planning (daily, weekly, monthly) • Explain Enterprise Budgeting • Explain Enterprise Combination • Explain production schedules for specific organic enterprises • Explain GANTT chart for production planning (revisit • Explain Flock / Herd Structure Explain • Explain Breeding Calendar • Explain seasonality and organic considerations • Explain contingency	Textbooks. Projector, whiteboard Internet.	budget for an organic sheep operation. • Develop a 12-month production schedule for the institution farm. • Build the schedule as a Gantt chart in Excel. • Design a flock-structure model for sustaining 500 layer birds with replacement. • Develop a breeding calendar for a 20-cow herd with year-round calving. • Develop a production plan for bee-keeping • Develop a contingency plan for a Newcastle disease outbreak in the organic poultry unit.	flock. • Develop an enterprise budget for an organic sheep operation. • Develop a 12-month production schedule for the institution farm. • Build the schedule as a Gantt chart in Excel. • Design a flock-structure model for sustaining 500 layer birds with replacement. • Develop a breeding calendar for a 20-cow herd with year-round calving. • Develop a production plan for bee-keeping • Develop a contingency plan for a Newcastle disease outbreak in	template. Gantt chart software (Excel). Flock structure template. Calendar template. Contingency plan template.

					the organic poultry unit.	
GENERAL OBJECTIVE 4.0: Know supply chain management for organic inputs and outputs.						
6-7	4.1 Define supply chain 4.2 Describe supply chain components 4.3 Describe organic supply chain particulars. 4.4 Describe Organic Input Supply 4.5 Describe Supplier Quality Management 4.6 Describe Procurement 4.7 Describe Inventory Management 4.8 Explain Logistics 4.9 Explain Cold Chain management for milk, eggs, meat 4.10 Explain Distribution channels 4.11 Describe Traceability in supply chain 4.12 Explain coordination among supply chain	• Explain supply chain. • Explain supply chain components • Explain organic supply chain particulars. • Explain Organic Input Supply • Explain Supplier Quality Management • Explain Procurement • Explain Inventory Management • Explain Logistics • Explain Cold Chain management for milk, eggs, meat • Explain Distribution channels • Explain Traceability in supply chain • Explain coordination among supply chain actors, associations,	Supply chain charts. Sample procurement and inventory forms. Reference textbooks. Projector, whiteboard.	• Map the supply chain for an organic-egg enterprise from chick-purchase to consumer. • Develop supplier specifications for organic-feed procurement. • Compute EOQ for organic-feed inventory. • Conduct inventory audit at the institution farm; • Recommend improvements. • Visit a logistics/cold-chain operation if available. • Design a cold-chain plan for organic milk distribution. • Identify supply chain bottlenecks in a	Guide students to; • Map the supply chain for an organic-egg enterprise from chick-purchase to consumer. • Develop supplier specifications for organic-feed procurement. • Compute EOQ for organic-feed inventory. • Conduct inventory audit at the institution farm; • Recommend improvements. • Visit a logistics/cold-chain operation if available. • Design a cold-chain plan for	Supply chain template. Specification template. EOQ calculator. Inventory audit form. Cold-chain plan template. Value chain scenarios.

	Actors, associations, contracts. 4.13 Explain Nigerian organic supply chain examples.	contracts. • Explain Nigerian organic supply chain examples		Nigerian organic-livestock value chain.	organic milk distribution. • Identify supply chain bottlenecks in a Nigerian organic-livestock value chain.	
GENERAL OBJECTIVE 5.0: Know organic- focused financial management						
8-9	5.1 Explain financial management basics. 5.1 Describe Budgeting for an organic farm 5.2 Describe Enterprise Budgets 5.3 Describe Partial Budgeting 5.4 Describe Cash Flow Management 5.5 Describe Profitability Analysis 5.6 Explain Premium Pricing for organic products 5.7 Explain Cost Structure 5.8 Describe Break-Even Analysis for organic enterprises.	• Explain financial management basics • Explain Budgeting for an organic farm • Explain Enterprise Budgets • Explain Partial Budgeting • Explain Cash Flow Management • Explain Profitability Analysis • Explain Premium Pricing for organic products • Explain Cost Explain • Explain Break-Even Analysis for organic enterprises. • Explain Economic	Sample budgets. Premium pricing data from Nigerian/international markets. Financial analysis templates. Textbooks. Projector, whiteboard.	• Develop an annual operating budget for a 50-ha organic mixed-livestock farm. • Develop a 12-month cash flow projection in Excel. • Conduct partial budgeting for switching one enterprise to organic. • Compute break-even for a 100-bird organic layer flock. • Compute ROI, IRR, NPV for a 5-year organic conversion investment. • Conduct sensitivity analysis on egg price	Guide students to; • Develop an annual operating budget for a 50-ha organic mixed-livestock farm. • Develop a 12-month cash flow projection in Excel. • Conduct partial budgeting for switching one enterprise to organic. • Compute break-even for a 100-bird organic layer flock. • Compute ROI,	Budget templates. Cash flow template. Calculator, Excel. Investment analysis templates. Pricing data sources. Software access.

	5.9 Describe Economic Evaluation of conversion 5.10 Explain Return on Investment (ROI) Internal Rate of Return (IRR), Net Present Value (NPV) for organic farm investments. 5.11 Explain Sensitivity Analysis 5.12 Explain Nigerian taxation for organic farms 5.13 Describe pricing strategies 5.14 Describe accounting software for farms	Evaluation of conversion • Explain Return on Investment (ROI) • Internal Rate of Return (IRR), • Net Present Value (NPV) for organic farm investments. • Explain Sensitivity Analysis • Explain Nigerian taxation for organic farms • Explain pricing strategies • Explain accounting software for farms		(10 % variation). • Research and document premium pricing for organic eggs, milk, honey in Nigeria. • Set up financial-management system for the institution farm.	IRR, NPV for a 5-year organic conversion investment. • Conduct sensitivity analysis on egg price (10 % variation). • Research and document premium pricing for organic eggs, milk, honey in Nigeria. • Set up financial-management system for the institution farm.	
GENERAL OBJECTIVE 6.0: Know conversion from conventional to organic livestock production.						
10-11	6.1 Describe Conversion (transition) from conventional to organic 6.2 Describe conversion period by 6.3 Describe Land	• Explain conversion from conventional to organic • Explain conversion period. • Explain land	Conversion guidelines (IFOAM, NOAN, etc). Sample conversion plans.	• Develop a 3-year conversion plan for a 20 ha. conventional pasture farm. • Estimate financial impact of conversion (yield drop, cost	Guide students to; • Develop a 3-year conversion plan for a 20 ha. conventional pasture farm. • Estimate financial	Conversion plan template. Financial impact template. Scheme information.

	Conversion 6.4 Describe Conversion Planning 6.5 Describe Conversion Challenges 6.6 Describe Conversion Support 6.7 Describe "IN-Conversion" labelling 6.8 Describe Parallel Production 6.9 Describe Complete and Partial conversion 6.10 Describe Record-Keeping during conversion 6.11 Describe Conversion Success Stories from Nigeria and Africa.	conversion. • Explain conversion planning. • Explain conversion challenges. • Explain conversion support. • Explain in-conversion labelling. • Explain parallel production. • Explain complete vs partial. • Explain record-keeping. • Explain success stories.	Success story case studies. Reference textbooks. Projector, whiteboard.	increase, premium recovery etc.) • Identify Nigerian government schemes supporting organic conversion. • Visit (in-person or virtual) a farm that has successfully converted to organic. • Develop a conversion success-story communication plan. • Develop record-keeping templates for the conversion period.	impact of conversion (yield drop, cost increase, premium recovery etc). • Identify Nigerian government schemes supporting organic conversion. • Visit (in-person or virtual) a farm that has successfully converted to organic. • Develop a conversion success-story communication plan. • Develop record-keeping templates for the conversion period.	Transport for visit. Communication plan template. Record templates.
GENERAL OBJECTIVE 7.0: Know marketing strategy for organic livestock products						
12-13	7.1 Explain marketing principles 7.2 Describe Organic	• Explain marketing principles. • Explain organic	CSA model documentation.	• Develop a customer segmentation for an organic-poultry	Guide students to; • Develop a customer	Segmentation template. Canva access.

	Market Segmentation 7.3 Describe Nigerian organic consumer profiles. 7.4 Describe Organic Branding 7.5 Describe Traceability-Driven Branding 7.6 Describe Marketing Channels 7.7 Describe Community-Supported Agriculture (CSA) 7.8 Describe Agritourism 7.9 Describe Digital Marketing. 7.10 Describe Customer Retention 7.11 Describe Pricing for organic. 7.12 Describe organic Marketing Challenges in Nigeria. 7.13 Describe Export Marketing 7.14 Describe Nigerian organic marketing success cases	Market segmentation. • Explain Nigerian organic consumer profiles. • Explain organic branding. • Explain traceability branding. • Explain marketing channels. • Explain CSA. • Explain agritourism. • Explain digital marketing. • Explain customer retention. • Explain pricing. • Explain marketing challenges. • Explain export. • Explain Nigerian cases.	Projector, whiteboard marker	enterprise. • Develop a brand identity (name, logo using various apps (Canva, Tagline) • Design a CSA subscription model with 4 product tiers. • Visit an organic shop or farmers' market; document marketing tactics. • Develop a 3-month digital marketing plan with content calendar. • Design a customer loyalty programme. • Design an export readiness plan for organic livestock products • Develop a marketing strategy for a hypothetical Nigerian organic mixed-livestock farm.	segmentation for an organic-poultry enterprise. • Develop a brand identity (name, logo using various apps (Canva, Tagline) • Design a CSA subscription model with 4 product tiers. • Visit an organic shop or farmers' market; document marketing tactics. • Develop a 3-month digital marketing plan with content calendar. • Design a customer loyalty programme. • Design an export readiness plan for organic livestock products • Develop a marketing strategy	CSA model template. Content calendar template. Loyalty programme template. Export plan template. Strategy template.

					for a hypothetical Nigerian organic mixed-livestock farm.	
GENERAL OBJECTIVE 8.0: Understand risk management production, market, financial, regulatory in organic enterprises.						
14-15	8.1 Define risk 8.2 Describe Risk Classification in organic livestock 8.3 Describe Risk Management Process 8.4 Describe Risk Response strategies 8.5 Describe Production Risk management. 8.6 Describe Market Risk management 8.7 Describe Financial Risk management 8.8 Describe Regulatory Risk management 8.9 Describe Livestock Insurance 8.10 Describe Business Continuity Planning 8.11 Describe Recording and Reviewing risks	• Explain risk. • Explain risk classification. • Explain risk management process. • Explain risk responses. • Explain production risk management. • Explain market risk management. • Explain financial risk management. • Explain regulatory risk management. • Explain livestock insurance. • Explain business continuity. • Explain risk register. • Explain organic-specific risks.	Projector, Textbook Journal Internet Whiteboard Marker Internet.	• Conduct a comprehensive risk assessment for the institutional organic farm. • Develop a risk register with likelihood, impact, and mitigation for top 15 risks. • Visit (in-person or virtual) NAIC or insurance broker to understand livestock insurance options. • Develop a business continuity plan for disease outbreak. • Review a risk scenario (e.g. flooding) and develop coordinated response.	Guide students to; • Conduct a comprehensive risk assessment for the institutional organic farm. • Develop a risk register with likelihood, impact, and mitigation for top 15 risks. • Visit (in-person or virtual) NAIC or insurance broker to understand livestock insurance options. • Develop a business continuity plan for disease outbreak. • Review a risk scenario (e.g. flooding) and	Risk register template. Insurance materials. Continuity plan template. Scenario materials.

	8.12 Describe Organic-Specific Risks 8.13 Describe Climate Risk 8.14 Describe risk culture	• Explain climate risk. • Explain risk culture.			develop coordinated response.	
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

ORGANIC FARM PRACTICE II

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC FARM PRACTICE II	**COURSE CODE: OAP 323**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 0**
YEAR: I SEMESTER: II	**PRE-REQUISITE: OAP 318**	**PRACTICAL: 4 HOURS/WEEK**
GOAL: This course is designed to equip students with skills to undertake organic livestock farm operations.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know organic cattle husbandry; 2.0 Know organic small-ruminant husbandry; 3.0 Know native-chicken husbandry; 4.0 Understand reproduction management; 5.0 Understand disease prevention and biosecurity at advanced level; 6.0 Know organic feed preparation, feedmill operation and ration formulation; 7.0 Know product processing milk, meat, eggs, honey to certified-organic standards.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY						
COURSE TITLE: ORGANIC FARM PRACTICE II			COURSE CODE: OAP 323		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 0 HOURS/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE: OAP 318		PRACTICAL: 4 HOURS/WEEK	
COURSE SPECIFICATION: PRACTICAL						
GOAL: This course is designed to equip students with skills to undertake organic livestock farm operations.						
GENERAL OBJECTIVE 1.0: Know organic cattle husbandry.						
THEORETICAL CONTENT				PRACTICAL ACTIVITIES		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2				• Conduct full morning routine release, head count, sick-animal observation, water and forage provision. • Conduct heat detection on 10 cows over 2 days; document signs and timing. • Identify and ear-tag newly purchased breeding bull.	Guide students to; • Conduct full morning routine release, head count, sick-animal observation, water and forage provision. • Conduct heat detection on 10 cows over 2 days; document signs and timing. • Identify and ear-tag newly purchased	Cattle, kraal, pasture. Lactometer. CMT kit. Weigh-band, BCS chart. Birthing kit, tags. Record sheets. PPE.

				• Assist with natural mating; record date, bull, cow. • Conduct hand-milking on 3 cows; • Record yield; • Analyse milk quality with lactometer. • Carry out udder health check; • Identify mastitis using California Mastitis Test (CMT). • Process growing calves weighing, body condition scoring, deworming with permitted herbal product. • Conduct pregnancy diagnosis via rectal palpation • Manage parturition and care of newborn calf — navel disinfection, colostrum administration, ID tagging. • Conduct disbudding or alternative (if permitted by organic standard).	breeding bull. • Assist with natural mating; record date, bull, cow. • Conduct hand-milking on 3 cows; • Record yield; • Analyse milk quality with lactometer. • Carry out udder health check; identify mastitis using California Mastitis Test (CMT). • Process growing calves weighing, body condition scoring, deworming with permitted herbal product. • Conduct pregnancy diagnosis via rectal palpation • Manage parturition and care of newborn calf — navel disinfection, colostrum administration, ID tagging. • Conduct disbudding or alternative (if permitted	

				• Manage evening routine head count, kraal return, security check. • Complete cattle records: breeding log, milk log, treatment log, mortality log.	by organic standard). • Manage evening routine head count, kraal return, security check. • Complete cattle records: breeding log, milk log, treatment log, mortality log	
GENERAL OBJECTIVE 2.0: Know organic small-ruminant husbandry						
3-4				• Conduct Daily morning and evening routines head count, observation, water, forage. • Detect heat on flock; • Record signs and timing of mating. • Conduct controlled mating - introduce ram/buck for defined period; record dates and dams. • Conduct pregnancy diagnosis using ultrasound or palpation, blood and urine analysis for estrogen level • Manage gestation - nutrition, body condition,	Guide students to; • Conduct Daily morning and evening routines head count, observation, water, forage. • Detect heat on flock; record signs and timing of mating. • Conduct controlled mating - introduce ram/buck for defined period; record dates and dams. • Conduct pregnancy diagnosis using ultrasound or palpation, blood and urine analysis for estrogen level	Small ruminants, shelter, pasture. Ultrasound (if available). Lambing kit. PPR vaccines, syringes. Hoof trimming tools. Weigh scale. Record sheets. PPE.

				parasite control. • Prepare lambing/kidding area; clean shelter, bedding, lambing pen. • Assist lambing/kidding; manage dystocia (with supervisor); process newborns. • Conduct routine flock health -vaccinations, hoof trimming, faecal egg count check, body condition scoring. • Manage milk-feeding orphans (if any) using organic-compliant milk replacer. • Weigh growing lambs/kids; • Record growth performance. • Cull non-productive members in line with welfare standards. • Complete small-ruminant records: breeding log, lambing log, growth log, treatment log.	• Manage gestation - nutrition, body condition, parasite control. • Prepare lambing/kidding area; clean shelter, bedding, lambing pen. • Assist lambing/kidding; manage dystocia (with supervisor); process newborns. • Conduct routine flock health -vaccinations, hoof trimming, faecal egg count check, body condition scoring. • Manage milk-feeding orphans (if any) using organic-compliant milk replacer. • Weigh growing lambs/kids; • Record growth performance. • Cull non-productive members in line with welfare standards. • Complete small-ruminant records:	

					breeding log, lambing log, growth log, treatment log.	
GENERAL OBJECTIVE 3.0: Know chicken husbandry.						
5-6				• Open coop, • Conduct head count and, observe, • Provide water and organic feed • Manage breeder flock: select breeding hens and cocks; maintain optimal sex ratio (1 cock to 6–8 hens). • Collect, clean and store hatching eggs. • Set up and operate small electric incubator (or use broody hens) • Conduct candling on day 7, 14, 18 to assess fertility and development. • Manage hatching on day 21. • Brood newly hatched chicks under heat lamp;	Guide students to; • Open coop, • Conduct head count and, observe, • Provide water and organic feed • Manage breeder flock: select breeding hens and cocks; maintain optimal sex ratio (1 cock to 6–8 hens). • Collect, clean and store hatching eggs. • Set up and operate small electric incubator (or use broody hens) • Conduct candling on day 7, 14, 18 to assess fertility and development. • Manage hatching on day 21. • Brood newly hatched	Breeding flock, coops. Incubator, candler. Brooder, heat lamp. Newcastle, IBD vaccines. Wing bands, applicator. Weigh scale. Wood ash, garlic. Record sheets, PPE.

				manage feed, water, temperature. • Conduct routine flock health (vaccination) • Wing-band chicks for individual identification. • Weigh chicks weekly; monitor growth. • Conduct organic-permitted parasite control -wood-ash dust bath, garlic in water. • Manage mortality • Dispose properly • Complete poultry records; hatch log, growth log, mortality log, treatment log.	chicks under heat lamp; manage feed, water, temperature. • Conduct routine flock health (vaccination) • Wing-band chicks for individual identification. • Weigh chicks weekly; monitor growth. • Conduct organic-permitted parasite control -wood-ash dust bath, garlic in water. • Manage mortality • Dispose properly • Complete poultry records; hatch log, growth log, mortality log, treatment log.	
GENERAL OBJECTIVE 4.0: Understand reproduction management						
7-8				• Conduct comprehensive oestrus detection on cattle, small ruminants, pigs (if available); use heat-mount detectors. • Practise AI on cattle (with cow restrained in	Guide students to; • Conduct comprehensive oestrus detection on cattle, small ruminants, pigs (if available); use heat-mount detectors. • Practise AI on cattle	Animals in heat. AI kit, semen, liquid nitrogen. Ultrasound (if available). OB sleeves, lubricant.

				crush)- thawing semen, loading gun, insertion technique (with supervisor). • Conduct pregnancy diagnosis on cows/ewes/sow/does (if equipment available). • Assist with normal parturition in any species (as opportunity arises). • Assist with dystocia management. • Maintain accurate breeding records -service date, expected calving/kidding/lambing, actual date, sex of offspring.	(with cow restrained in crush)- thawing semen, loading gun, insertion technique (with supervisor). • Conduct pregnancy diagnosis on cows/ewes/sow/does (if equipment available). • Assist with normal parturition in any species (as opportunity arises). • Assist with dystocia management. • Maintain accurate breeding records - service date, expected calving/kidding/lambing, actual date, sex of offspring.	Birthing kit. Breeding records.
GENERAL OBJECTIVE 5.0: Understand disease prevention and biosecurity at advanced level.						
9-10				• Conduct bio-security audit at the institutional farm; • Implement / refresh biosecurity protocols - footbath, visitor log, PPE,	Guide students to; • Conduct bio-security audit at the institutional farm; • Implement / refresh biosecurity protocols -	Bio-security infrastructure. Vaccines, syringes. Sample collection kit.

				isolation pen. • Conduct vaccination programmes • Take samples for laboratory investigation - blood, faecal, swab, biopsy samples; • Package and label appropriately. • Maintain isolation pen for sick animals; • Follow strict separation protocols. • Conduct disease surveillance - daily checks of all animals; • Record observations. • Practise post-mortem examination on animal carcass (with supervisor). • Manage carcass disposal - deep burial, incineration; bio-security considerations. • Develop predictive disease control and outbreak response. • Logbook reflection.	footbath, visitor log, PPE, isolation pen. • Conduct vaccination programmes • Take samples for laboratory investigation - blood, faecal, swab, biopsy samples; • Package and label appropriately. • Maintain isolation pen for sick animals; • Follow strict separation protocols. • Conduct disease surveillance - daily checks of all animals; • Record observations. • Practise post-mortem examination on animal carcass (with supervisor). • Manage carcass disposal - deep burial, incineration; bio-security considerations. • Develop predictive disease control and outbreak response.	Isolation pen. PM kit, PPE. Disposal area. Outbreak response plan template.

GENERAL OBJECTIVE 6.0: Know organic feed preparation, feedmill operation and ration formulation.						
11-12				• Receive, inspect and store organic feed ingredients - maize, soybean, oyster shell, palm kernel cake. • Conduct quality analysis or rapid assessment of feed quality. • Operate the feed mill - mixer, hammer mill, pellet mill (where available); • Follow safety protocols. • Mix 100 kg batch of organic chicken starter feed using a prepared formulation. • Mix 100 kg batch of organic layer feed. • Mix 100 kg batch of organic pig feed. • Prepare urea- organic molasses-multinutrient block for ruminants (organic-compliant ingredients). • Prepare silage, hay,	Guide students to; • Receive, inspect and store organic feed ingredients - maize, soybean, oyster shell, palm kernel cake. • Conduct quality analysis or rapid assessment of feed quality. • Operate the feed mill - mixer, hammer mill, pellet mill (where available) • Follow safety protocols. • Mix 100 kg batch of organic chicken starter feed using a prepared formulation. • Mix 100 kg batch of organic layer feed. • Mix 100 kg batch of organic pig feed. • Prepare urea- organic molasses-multinutrient block for ruminants (organic-compliant ingredients).	Feedmill, mixer, hammer mill. Feed ingredients. Scales, bags, labels. Block-making materials. Silage, hay haylage materials. Cleaning equipment. PPE — dust masks, safety boots. Records.

				haylage from grass and legume forage. • Bag, label and store finished feed; maintain FIFO inventory. • Conduct quality control on finished feed. • Clean and sanitise feedmill equipment after use. • Complete feedmill records; ingredients in, formulations used, batches produced and distribution.	• Prepare silage, hay, haylage from grass and legume forage. • Bag, label and store finished feed; maintain FIFO inventory. • Conduct quality control on finished feed. • Clean and sanitise feedmill equipment after use. • Complete feedmill records; ingredients in, formulations used, batches produced and distribution.	
GENERAL OBJECTIVE 7.0: Know product processing milk, meat, eggs, honey to certified-organic standards.						
13-15				• Carry out Milk Processing; receive raw milk, conduct quality tests (acidity, density, fat), pasteurise, package and label. • Make yoghurt and "wara" (West African soft cheese) from milk. • Conduct ante-mortem and post-mortem inspection;	Guide students to; • Carry out Milk Processing • Make yoghurt and "wara" (West African soft cheese) from milk. • Conduct ante-mortem and post-mortem inspection; humane slaughtering (organic	Pasteuriser, yoghurt incubator, cheese-making vat. Slaughter facility. Egg-grading equipment. Honey extractor. CCP record sheets.

				humane slaughtering (organic welfare standards); halal-compliant where applicable; carcass cooling; cutting; packaging. • Egg Processing - collect eggs, clean (dry brush method preferred for organic), candle, weigh, grade, pack in organic-labelled cartons. • Honey processing -uncap combs, extract honey using extractor, filter, settle, bottle, label. • Maintain CCP records during all processing. • Conduct sensory evaluation of processed products. • Verify processing compliance with organic standards (no synthetic additives). • Maintain processing equipment per SGA Item 20 - cleaning, sanitising,	welfare standards); halal-compliant where applicable; carcass cooling; cutting; packaging. • Egg Processing - collect eggs, clean (dry brush method preferred for organic), candle, weigh, grade, pack in organic-labelled cartons. • Honey processing -uncap combs, extract honey using extractor, filter, settle, bottle, label. • Maintain CCP records during all processing. • Conduct sensory evaluation of processed products. • Verify processing compliance with organic standards (no synthetic additives). • Maintain processing equipment per SGA Item 20 - cleaning, sanitising, calibration.	NAFDAC-compliant labels. PPE, sanitation supplies.

				calibration.		

COURSE ASSESSMENT:
Course Assessment (Practical Based): 10%
Practical: 50%
Examination (Practical Based): 40%
Total: 100%

ORGANIC ANIMAL NUTRITION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC ANIMAL NUTRITION	**COURSE CODE: OAP 324**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with comprehensive knowledge and skills in organic animal nutrition, addressing the unique nutritional challenges of organic livestock systems.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the major nutrient classes and their roles in livestock nutrition; 2.0 Know feed evaluation methods; 3.0 Understand organic-permitted feed ingredients and their nutritional characteristics for Nigerian organic livestock; 4.0 Know ration formulation techniques; 5.0 Know feeding standards for organic poultry, ruminants and swine; 6.0 Know organic-specific restrictions; 7.0 Understand mineral and vitamin supplementation in organic systems using natural sources; 8.0 Operate feed processing equipment and a feed mill for organic feed production; 9.0 Understand the economics of organic feeding.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION		
COURSE TITLE: ORGANIC ANIMAL NUTRITION	**COURSE CODE: OAP 324**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 3 HOURS/WEEK**
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with comprehensive knowledge and skills in organic animal nutrition, addressing the unique nutritional challenges of organic livestock systems.		
GENERAL OBJECTIVE 1.0: Understand the major nutrient classes and their roles in livestock nutrition		

THEORETICAL CONTENT				**PRACTICAL CONTENT**		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define nutrition, nutrient, feed, ration, diet. 1.2 Describe the major nutrient classes and their general roles. 1.3 Describe Carbohydrates 1.4 Describe Proteins 1.5 Describe Fats / Lipids 1.6 Describe Vitamins	• Explain nutrition terms. nutrient, feed, ration, diet. • Discuss nutrient classes. • Discuss; ✓ carbohydrates. ✓ proteins. ✓ fats/lipids. ✓ vitamins. ✓ minerals. ✓ water.	Whiteboard, Projector. Reference Textbooks, NRC/NIAS publications, Deficiency images. Computer Internet Journal	• Identify common organic feed ingredients - maize, soybean meal, fish meal, oyster shell, salt, palm kernel cake, groundnut cake- by appearance and texture. • Conduct simple Benedict's and Fehling's tests to	Guide students to; • Identify common organic feed ingredients - maize, soybean meal, fish meal, oyster shell, salt, palm kernel cake, groundnut cake- by appearance and texture. • Conduct simple Benedict's and Fehling's tests to	Feed ingredients samples. Test reagents. Deficiency images. Nutrient inventory template. Institutional feed store.

	1.7 Describe Minerals 1.8 Describe Water 1.9 Describe nutrient deficiencies 1.10 Describe Nutrient Interactions	• Discuss nutrient deficiencies. • Discuss vitamin-mineral interactions.		demonstrate carbohydrate types. • Identify deficiency signs from photo gallery; rickets, scaly leg, perosis, pica, parakeratosis. • Develop a nutrient inventory of 10 Nigerian feed ingredients.	demonstrate carbohydrate types. • Identify deficiency signs from photo gallery; ickets, scaly leg, perosis, pica, parakeratosis. • Develop a nutrient inventory of 10 Nigerian feed ingredients.	
GENERAL OBJECTIVE 2.0: Know feed evaluation methods						
3-4	2.1 Describe Proximate 2.2 Describe procedures 2.3 Describe Detergent Fibre System (Van Soest) 2.4 Describe Energy Systems: ✓ Gross Energy (GE) ✓ Digestible Energy (DE) ✓ Metabolisable Energy (ME) ✓ Net Energy (NE) for maintenance, gain, lactation.	• Explain Proximate • Explain procedures • Discuss Detergent Fibre System (Van Soest) • Explain Energy Systems: ✓ Gross Energy (GE) ✓ Digestible Energy (DE) ✓ Metabolisable Energy (ME) ✓ Net Energy (NE) for maintenance, gain, lactation. • Explain Digestibility.	Reference textbooks. Projector, whiteboard Journal Internet Computer.	• Conduct DM determination on 3 feed samples (oven drying at 105 °C). • Conduct CP analysis using Kjeldahl (or commercial kit). • Conduct CF analysis using acid-alkali digestion. • Conduct ash analysis using muffle furnace. • Calculate proximate composition; compute NFE by difference. • Compute ME of a	Guide students to; • Conduct DM determination on 3 feed samples (oven drying at 105 °C). • Conduct CP analysis using Kjeldahl (or commercial kit). • Conduct CF analysis using acid-alkali digestion. • Conduct ash analysis using muffle furnace. • Calculate proximate composition; compute NFE by difference.	Analytical laboratory. Oven, muffle furnace. Kjeldahl apparatus. Acid, alkali reagents. Feed samples. PPE, safety equipment. Calculator, Excel.

	2.5 Describe Digestibility. 2.6 Describe Amino Acid Profile analysis. 2.7 Describe Mineral analysis 2.8 Describe Antinutritional Factors 2.9 Describe rapid evaluation methods 2.10 Describe feed standards and quality benchmarks for common ingredients.	• Explain Amino Acid Profile analysis. • Explain Mineral analysis • Explain Antinutritional Factors • Explain Antinutritional Factors • Explain rapid evaluation methods • Explain feed standards and quality benchmarks for common ingredients.		feed using regression equation. • Identify antinutritional factors in 5 ingredients. • Compare proximate composition of conventional vs organic ingredient samples.	• Compute ME of a feed using regression equation. • Identify antinutritional factors in 5 ingredients. • Compare proximate composition of conventional vs organic ingredient samples.	
GENERAL OBJECTIVE 3.0: Understand organic-permitted feed ingredients and their nutritional characteristics for Nigerian organic livestock.						
5-6	3.1 Describe the organic feed requirement 3.2 Describe organic Cereal Grains 3.3 Describe organic Protein Sources 3.4 Describe Legumes and Pulses 3.5 Describe Organic	• Explain organic feed requirement. • Explain cereals. • Explain protein sources. • Explain legumes. • Explain forages. • Explain by-products. • Explain alternative	IFOAM, NOAN feed ingredient lists. Sample organic ingredients. Nutritional composition	• Identify 20 ingredients by appearance, texture, smell. • Compute nutrient profile of 5 Nigerian by-products from proximate analysis values.	Guide students to; • Identify 20 ingredients by appearance, texture, smell. • Compute nutrient profile of 5 Nigerian by-products from proximate analysis values.	Sample ingredients. Nutritional tables. Transport for visit. Sourcing plan template.

	Forages 3.6 Describe organic agro-Industrial by-products 3.7 Describe Alternative Protein Sources 3.8 Describe Root and Tuber Crops 3.9 Describe Organic Mineral and Vitamin Sources 3.10 Describe Prohibited Ingredients in organic feed 3.11 Describe the IFOAM feed-ingredient list and how to interpret it. 3.12 Describe sourcing organic ingredients in Nigeria	protein. • Explain roots/tubers. • Explain mineral/vitamin sources. • Explain prohibited ingredients. • Explain IFOAM list. • Explain Nigerian sourcing.	tables. Reference textbooks. Projector, whiteboard.	• Visit (in-person or virtual) an organic feed-ingredient supplier. • Prepare a sourcing plan for organic ingredients in Nigeria. • Cultivate black soldier fly larvae or azolla as alternative protein source.	• Visit (in-person or virtual) an organic feed-ingredient supplier. • Prepare a sourcing plan for organic ingredients in Nigeria. • Cultivate black soldier fly larvae or azolla as alternative protein source.	BSFL or azolla cultivation setup. IFOAM list document.
GENERAL OBJECTIVE 4.0: Know ration formulation						
7-8	4.1 Describe Ration Formulation Objectives 4.2 Describe Pearson	• Explain ration formulation objectives. • Explain Pearson	Pearson Square examples. NRC/NIAS	• Formulate 100 kg poultry-starter feed using Pearson Square for 22 % CP.	Guide students to; • Formulate 100 kg poultry-starter feed using Pearson Square	Calculator, Excel. NRC/NIAS tables.

	Square 4.3 Describe Double Pearson Square 4.4 Describe Linear Programming (LP) 4.5 Describe constraints in organic formulation 4.6 Describe Commercial Feed Software 4.7 Describe what to formulate for which species and class 4.8 Describe Nutrient Requirements standards 4.9 Describe Formulation Iteration	Square. • Explain Double Pearson Square. • Explain linear programming. • Explain organic constraints. • Explain commercial software. • Explain species/class formulations. • Explain requirement standards. • Explain iteration. • Explain least-cost feed formulation	requirement tables. Reference textbooks. Projector Whiteboard Computer Internet Journal.	• Formulate 100 kg layer feed using Double Pearson Square for 16.5 % CP and 3.5 % Ca. • Set up Excel Solver for least-cost organic-layer formulation. • Explore a free feed-formulation software (e.g. Online Feed Calculator). • Formulate ration for organic pig starter, organic dairy concentrate, organic beef-feedlot ration. • Formulate ration meeting all organic constraints (no synthetic methionine substitution). • Formulate 5 different organic rations for the institution farm.	for 22 % CP. • Formulate 100 kg layer feed using Double Pearson Square for 16.5 % CP and 3.5 % Ca. • Set up Excel Solver for least-cost organic-layer formulation. • Explore a free feed-formulation software (e.g. Online Feed Calculator). • Formulate ration for organic pig starter, organic dairy concentrate, organic beef-feedlot ration. • Formulate ration meeting all organic constraints (no synthetic methionine substitution). • Formulate 5 different organic rations for the institution farm.	Solver-equipped computer. Feed software. Formulation worksheets. Institutional farm data.
GENERAL OBJECTIVE 5.0: Know feeding standards for organic poultry, ruminants and swine.						
9-10	5.1 Describe Feeding Standards	• Explain feeding standards.	NIAS publications.	• Feed cattle and small ruminants daily at the	Guide students to; • Feed cattle and small	Live animals.

	5.2 Discuss ARCN (Agricultural Research Council of Nigeria). 5.3 Describe FAO and INRA feeding standards. 5.4 Explain maintenance, production and pregnancy/lactation requirements. 5.5 Explain Poultry Feeding 5.6 Describe organic poultry-specific issues 5.7 Explain Ruminant Feeding 5.8 Describe organic ruminant-specific issues 5.9 Describe Swine Feeding 5.10 Describe organic swine-specific issues 5.11 Describe Mini-Livestock and Apiculture feeding	• Explain ARC. • Explain FAO/INRA. • Discuss requirement categories. • Explain poultry feeding. • Explain organic poultry issues. • Explain ruminant feeding. • Explain organic ruminant issues. • Explain swine feeding. • Explain organic swine issues. • Explain mini livestock/apiculture. • Explain seasonal adjustments.	Reference textbooks. Projector, whiteboard Internet Journal Computer	institution farm; • Measure intake; • Compare to NIAS standard. • Feed poultry per phase; • Measure feed consumption and growth. • Feed pigs per phase; • Measure intake. • Design a complete feeding programme for organic broiler production cycle. • Design a feeding programme for organic dairy cow producing 8 kg milk/day. • Design a feeding programme for organic-pig grower-finisher. • Adjust feeding programme for dry season vs wet season.	ruminants daily at the institution farm; • Measure intake; • Compare to NIAS standard. • Feed poultry per phase; • Measure feed consumption and growth. • Feed pigs per phase; • Measure intake. • Design a complete feeding programme for organic broiler production cycle. • Design a feeding programme for organic dairy cow producing 8 kg milk/day. • Design a feeding programme for organic-pig grower-finisher. • Adjust feeding programme for dry season vs wet season.	Feed, weighing equipment. NIAS tables. Programme templates. Calculator.

	(cross-reference OAP 327, OAP 328). 5.12 Describe Seasonal Feeding adjustments					
GENERAL OBJECTIVE 6.0: Know organic-specific restrictions						
11-12	6.1 Describe organic-specific feed restrictions 6.2 Describe the Methionine Challenge in organic poultry 6.3 Describe Lysine management 6.4 Describe Alternatives to synthetic amino acids 6.5 Describe GMO, effluent and chemical residues Testing and verification. 6.6 Describe Ration Design approaches 6.7 Describe Organic Feed Certification	• Explain restrictions. • Explain methionine challenge. • Explain lysine management. • Explain alternatives. • Explain GMO testing. • Explain ration design. • Explain feed certification. • Explain prohibited additives. • Explain allowed additives. • Explain eco-friendly additives. • Explain design challenges.	Organic feed standards. Sample feed labels, Reference textbooks. Projector, whiteboard.	• Test ingredients for GMOs (soybean, maize) effluent and chemical residues. • Design an organic broiler ration without synthetic methionine using sunflower seed and BSFL. • Visit organic-feed supplier • Verify certification document • Read 5 commercial feed labels; • Identify compliance/non-compliance with organic standards. • Compare 3 organic poultry feed formulations on cost,	Guide students to; • Test ingredients for GMOs (soybean, maize) effluent and chemical residues. • Design an organic broiler ration without synthetic methionine using sunflower seed and BSFL. • Visit organic-feed supplier • Verify certification document • Read 5 commercial feed labels; • Identify compliance/non-compliance with organic standards. • Compare 3 organic poultry feed	Sample feed labels. Calculator, Excel. Transport for visit. gadgets Formulation worksheets. Strategy template.

	verification. 6.8 Describe Prohibited Additives list under various standards. 6.9 Describe Allowed Additives 6.10 Describe Eco-Friendly Feed additives 6.11 Describe Design Challenges			nutrient supply, and compliance. • Design organic feed strategy for a 1000-bird layer farm.	formulations on cost, nutrient supply, and compliance. • Design organic feed strategy for a 1000-bird layer farm.	
GENERAL OBJECTIVE 7.0: Know mineral and vitamin supplementation in organic systems using natural sources.						
13	7.1 Explain importance of minerals and vitamins despite small quantities. 7.2 Describe Natural Mineral Sources 7.3 Describe Natural Vitamin Sources 7.4 Describe Fortified Premixes 7.5 Describe Mineral Block and Salt Lick 7.6 Describe Free-Choice feeding of minerals. 7.7 Describe Soil-Plant-Animal Mineral	• Explain mineral/vitamin importance. • Explain mineral sources. • Explain vitamin sources. • Explain fortified premixes. • Explain mineral blocks. • Explain free-choice feeding. • Describe soil-plant-Explain cycle. • Explain deficiency diagnosis.	Soil/feed analysis reports. Reference textbooks. Projector.	• Prepare a mineral mix for poultry using natural ingredients. • Prepare a urea-molasses-multinutrient block for ruminants. • Install salt licks and free-choice mineral stations at the institution farm. • Design a mineral and vitamin supplementation plan for the institution farm. • Review soil test results for the area; • Identify likely mineral	Guide students to; • Prepare a mineral mix for poultry using natural ingredients. • Prepare a urea-molasses-multinutrient block for ruminants. • Install salt licks and free-choice mineral stations at the institution farm. • Design a mineral and vitamin supplementation plan for the institutional farm. • Review soil test results	Mineral ingredients. Block-making materials. Salt licks, dispensers. Plan template. Soil test reports.

	Cycle 7.8 Describe Deficiency Diagnosis 7.9 Describe Toxicity. 7.10 Describe Urinometry for trace minerals. 7.11 Describe Nigerian Soil Deficiencies affecting livestock	• Discuss toxicity. • Discuss urinometry. • Explain Nigerian deficiencies.		deficiencies. • Monitor animals for deficiency signs over 2 weeks.	for the area; • Identify likely mineral deficiencies. • Monitor animals for deficiency signs over 2 weeks.	
GENERAL OBJECTIVE 8.0: Operate feed processing equipment and a feed mill for organic feed production.						
14	8.1 Describe Feed Processing objectives 8.2 Describe Processing Methods 8.3 Explain Feed mill Components (SGA Item 18) 8.4 Explain Hammer Mill operation 8.5 Describe Mixer operation 8.6 Explain Pellet Mill 8.7 Describe Feed mill Safety 8.8 Explain Feed mill	• Explain feed processing. • Explain processing methods. • Explain feed mill components. • Explain hammer mill. • Explain mixer. • Explain pellet mill. • Explain safety. • Explain hygiene. • Explain records. • Explain small-scale processing. • Explain feed storage. • Explain	Feed mill diagrams and SOPs. Sample NIAS standard manuals. Reference textbooks. Projector, whiteboard.	• Operate hammer mill on cereal grains; • Assess product particle size. • Operate vertical mixer • Conduct mixing uniformity test. • Operate pellet mill produce pelleted feed; cool and bag. • Receive, inspect, store batch of organic feed ingredients. • Produce 500 kg of organic poultry feed end-to-end in a	Guide students to; • Operate hammer mill on cereal grains; • Assess product particle size. • Operate vertical mixer; • conduct mixing uniformity test. • Operate pellet mill produce pelleted feed; cool and bag. • Receive, inspect, store batch of organic feed ingredients. • Produce 500 kg of organic poultry feed	Feedmill, hammer mill, mixer, pellet mill. Feed ingredients. Mycotoxin test kit. Cleaning equipment. PPE. SOPs template.

	hygiene for organic compliance. 8.9 Describe feed mill records. 8.10 Describe Small-Scale Feed Processing for smallholder organic farmers. 8.11 Describe feed storage. 8.12 Describe Moulds and Mycotoxins. 8.13 Describe equipment maintenance (SGA Item 20). 8.14 Describe Energy Use in feed mill operations.	moulds/mycotoxins. • Explain equipment maintenance. • Explain energy use.		designated organic • feed mill thoroughly between organic and any other production. • Conduct mycotoxin rapid test on stored feed. • Maintain feed mill equipment per SOP; • Record maintenance. • Develop feed mill SOPs for organic-only production.	end-to-end in a designated organic • Feed mill thoroughly between organic and any other production. • Conduct mycotoxin rapid test on stored feed. • Maintain feed mill equipment per SOP; • Record maintenance. • Develop feed mill SOPs for organic-only production.	
GENERAL OBJECTIVE 9.0: Evaluate the economics of organic feed.						
15	9.1 Describe Cost Structure of organic feed 9.2 Describe Cost Drivers 9.1 Describe Feed Cost 9.2 Describe Feed	• Explain cost structure. • Explain cost drivers. • Explain feed cost share. • Explain FCR. • Explain cost optimisation.	Lecture note, textbooks Projector, whiteboard marker.	• Compute the cost per kg of organic vs conventional broiler feed. • Compute the economic feasibility of organic broiler	Guide students to; • Compute the cost per kg of organic vs conventional broiler feed. • Compute the economic feasibility of organic	Cost data. Feasibility template. Business plan template.

	Conversion Ratio (FCR) 9.3 Describe Organic Feed Cost Optimisation 9.4 Describe Break-Even analysis for organic feed cost in different production systems. 9.5 Describe Organic Product Premium versus feed cost 9.6 Describe Sustainability Considerations 9.7 Describe Life Cycle Assessment (LCA) of organic feed. 9.8 Describe Future Trends 9.9 Describe Entrepreneurship. 9.10 Describe Career Pathways	• Explain break-even. • Explain premium vs cost. • Explain sustainability. • Explain LCA. • Explain future trends. • Explain entrepreneurship. • Explain career pathways.		production using premium pricing. • Develop a feed-cost-reduction plan for the institution farm. • Design an organic feed-mill business plan. • Develop a complete organic nutrition plan for the institution farm.	broiler production using premium pricing. • Develop a feed-cost-reduction plan for the institution farm. • Design an organic feed-mill business plan. • Develop a complete organic nutrition plan for the institution farm.	

COURSE ASSESSMENT:
Course work: 10%
Test/Assignments: 10%
Practical: 40%

Examination:	40%
Total:	**100%**

ORGANIC SMALL RUMINANT PRODUCTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC SMALL RUMINANT PRODUCTION	**COURSE CODE: OAP 325**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills of organic sheep and goat production in Nigeria.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the role of organic small ruminants' production systems in Nigerian livelihoods and food security; 2.0 Understand indigenous Nigerian sheep and goat breeds and their adaptations; 3.0 Know small-ruminant reproductive physiology and management in organic systems; 4.0 Know organic housing, pasture and feeding systems for small ruminants; 5.0 Know lambing, kidding and newborn management to organic standards; 6.0 Know organic small-ruminant health management; 7.0 Know organic goat-milk production and processing for the value-added market; 8.0 Know meat cut and marketing; 9.0 Evaluate the economic and entrepreneurial opportunities in organic small-ruminant production.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC SMALL RUMINANT PRODUCTION	COURSE CODE: OAP 325	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NIL	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills to organic sheep and goat production in Nigeria		
GENERAL OBJECTIVE 1.0: Understand the role of organic small ruminants' production systems in Nigerian livelihoods and food security.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define small ruminant; 1.2 Describe the global and Nigerian small-ruminant population 1.3 Describe the role of small ruminants in livelihoods 1.4 Describe small ruminants in organic systems 1.5 Describe advantages of small ruminants 1.6 Describe small-	• Explain small ruminant; • Explain the global and Nigerian small-ruminant population • Explain the role of small ruminants in livelihoods • Discuss small ruminants in organic systems • Discuss the advantages of small	Whiteboard Projector Textbook Journal Internet.	• Visit local small-ruminant market; • Observe pricing patterns, breeds, conditions. • Identify three small-ruminant cooperatives or projects in Nigeria.	Guide students to; • Visit local small-ruminant market; • Observe pricing patterns, breeds, conditions. • Identify three small-ruminant cooperatives or projects in Nigeria.	Transport for market. Pricing data. Discussion prompts. Internet, research worksheet.

	ruminant contribution to Animal Protein supply in Nigeria. 1.7 Describe small-ruminant Products 1.8 Describe regional distribution 1.9 Describe the role of NIAS, NAERLS, ARCN, NAPRI, NVRI and Universities in small-ruminant research and extension.	ruminants • Discuss small-ruminant contribution to Animal Protein supply in Nigeria. • Discuss small-ruminant Products • Describe regional distribution • Discuss the role of NIAS, NAERLS, ARCN, NAPRI, NVRI and Universities in small-ruminant research and extension.				
GENERAL OBJECTIVE 2.0: Understand Local Nigerian sheep and goat breeds and their adaptations.						
2	2.1 Describe Sheep Taxonomy 2.2 Describe Nigerian Indigenous Sheep Breeds: ✓ Yankasa ✓ Balami ✓ Uda. ✓ Sahel (pelle) ✓ West african dwarf 2.3 Describe Goat	• Explain sheep taxonomy. • Explain Nigerian Indigenous Sheep Breeds: ✓ Yankasa. ✓ Balami. ✓ Uda. ✓ Sahel/Pelle. ✓ WAD sheep. • Explain goat	Whiteboard Projector Textbook Journal Internet.	• Identify available breeds at the institutional farm; • Identify distinguishing characteristics. • Take measurements (height, length, body weight, scrotal circumference for males) of available	Guide students to; • Identify available breeds at the institutional farm; • Identify distinguishing characteristics. • Take photographs and measurements (height, length, body weight, scrotal	Live animals. Measuring equipment. Camera/smart phone. Adaptation chart template. Selection plan template.

	Taxonomy. 2.4 Describe Nigerian Indigenous Goat Breeds: i. West african dwarf (wad) goat ii. Sokoto red (Maradi) iii. Kano brown iv. Sahel goat 2.5 Describe Breed Adaptations 2.6 Describe productivity traits 2.7 Describe Conservation status of Nigerian indigenous breeds. 2.8 Describe Breed Selection for organic systems	taxonomy. • Explain Nigerian Indigenous Goat Breeds: ✓ West african dwarf (wad) goat ✓ Sokoto red (Maradi) ✓ Kano brown ✓ Sahel goat • Explain breed adaptations. • Explain productivity traits. • Explain conservation. • Explain organic breed selection.		breeds. • Design a breed selection plan for organic farm in a specific Nigerian state.	circumference for males) of available breeds. • Design a breed selection plan for organic farm in a specific Nigerian state.	
GENERAL OBJECTIVE 3.0: Know small ruminant reproductive physiology and management in organic systems.						
3-4	3.1 Describe reproductive anatomy of male and female sheep and goats 3.2 Describe hormonal control of reproduction	• Explain reproductive anatomy of male and female • Explain hormonal control. • Explain anatomical differences.	Anatomical models, charts. Textbooks. Journal Computer Internet	• Identify reproductive anatomy in dissected specimens. • Conduct breeding soundness examination on rams and bucks.	Guide students to ; • Identify reproductive anatomy in dissected specimens. • Conduct breeding soundness examination on rams	Dissection specimens. BSE equipment. Live animals. Programme template.

	3.3 described anatomical differences. 3.4 Describe puberty. 3.5 Describe seasonality. 3.6 Describe breeding soundness examination of rams and bucks. 3.7 Describe mating systems. 3.8 Describe breeding-ratio. 3.9 Describe flushing. 3.10 Describe synchronisation 3.11 Describe pregnancy. 3.12 Describe prenatal nutrition and health. 3.13 Describe prolificacy.	• Explain puberty. • Explain oestrous cycle. • Explain seasonality. • Explain breeding soundness examination of rams and bucks. • Explain mating systems. • Explain breeding ratio. • Explain flushing. • Explain synchronisation. • Explain pregnancy. • Explain prenatal care. • Explain prolificacy.	Projector, whiteboard.	• Detect oestrus in ewes/does using teaser male or observation; • Record signs. • Conduct controlled natural mating. • Design a breeding programme for the institution small-ruminant flock; • Calculate breeding dates and expected lambing/kidding. • Conduct pregnancy diagnosis using palpation, urine analysis or ultrasound. • Implement flushing 2 weeks before mating. • Identify organic-compliant synchronisation methods (ram-effect, buck-effect).	and bucks. • Detect oestrus in ewes/does using teaser male or observation; • Record signs. • Conduct controlled natural mating. • Design a breeding programme for the institution small-ruminant flock; • Calculate breeding dates and expected lambing/kidding. • Conduct pregnancy diagnosis using palpation, urine analysis or ultrasound. • Implement flushing 2 weeks before mating. • Identify organic-compliant synchronisation methods (ram-effect, buck-effect).	Ultrasound (if available). Calculator.
GENERAL OBJECTIVE 4.0: Know organic housing, pasture and feeding systems for small ruminants.						

5-6	4.1 Explain housing requirements 4.2 Explain space requirements 4.3 Explain housing types 4.4 Explain organic-housing materials 4.5 Explain pasture-based systems 4.6 Explain browsing vs grazing 4.7 Explain forages suitable for small ruminants in Nigeria 4.8 Explain silvopastoral systems. 4.9 Explain supplementary feeding 4.10 Explain water provision	• Explain housing requirements. • Explain space requirements. • Explain housing types. • Explain materials. • Explain pasture-based systems. • Explain browsing vs grazing. • Explain Nigerian forages. • Explain silvopastoral. • Explain supplementary feeding. • Explain water. • Explain zero-grazing.	Textbooks. Projector, Whiteboard Computer Internet Marker.	• Assess existing housing at the institution farm; • Identify gaps relative to organic standards. • Design housing for 50-head sheep flock in southern Nigeria. • Design housing for 50-head goat flock in northern Nigeria. • Assess pasture quality at the institutional farm; • Estimate carrying capacity. • Plant a multi-species pasture mixture with grasses and legumes. • Install a salt-lick station for the flock. • Design a feeding programme for the dry season for a flock. • Design a zero-grazing system for a	Guide students to; • Assess existing housing at the institution farm; • Identify gaps relative to organic standards. • Design housing for 50-head sheep flock in southern Nigeria. • Design housing for 50-head goat flock in northern Nigeria. • Assess pasture quality at the institutional farm; Estimate carrying capacity. • Plant a multi-species pasture mixture with grasses and legumes. • Install a salt-lick station for the flock. • Design a feeding programme for the dry season for a flock. • Design a zero-grazing system for a peri-urban goat	Institutional farm. Pasture plots, seeds. Salt licks. Plan template. Housing materials Calculator.

				peri-urban goat enterprise.	enterprise.	
GENERAL OBJECTIVE 5.0: Know lambing, kidding and newborn management to organic standards.						
7-8	5.1 Explain Signs of Impending Parturition 5.2 Explain normal Lambing/Kidding process 5.3 Explain Dystocia 5.4 Explain Lambing/Kidding area preparation. 5.5 Explain Newborn Care 5.6 Explain Colostrum importance. 5.7 Explain Identification 5.8 Explain Orphan management 5.9 Explain dehorning/castration 5.10 Explain lamb/kid nutrition 5.11 Explain growth monitoring. 5.12 Explain common newborn problems	• Explain signs of parturition. • Explain lambing/kidding stages. • Explain dystocia. • Explain area preparation. • Explain newborn care. • Explain colostrum. • Explain identification. • Explain orphan management. • Explain dehorning/castration. • Explain lamb/kid nutrition. • Explain growth monitoring. • Explain newborn problems.	Whiteboard Textbooks. Projector Computer Internet Journal	• Observe signs of impending parturition in pregnant ewes/does. • Prepare lambing/kidding pen. • Assist normal parturition • Process newborns; clean airways, disinfect navel (organic alternative), administer colostrum, tag, and weigh • Castrate / band male lambs (with anaesthesia where required by standards). • Manage orphan or rejected lamb/kid using bottle feeding. • Monitor lamb/kid growth weekly • Identify common	Guide students to; • Observe signs of impending parturition in pregnant ewes/does. • Prepare lambing/kidding pen. • Assist normal parturition. • Process newborns; clean airways, disinfect navel (organic alternative), administer colostrum, tag, weigh. • Castrate / band male lambs (with anaesthesia where required by standards). • Manage orphan or rejected lamb/kid using bottle feeding. • Monitor lamb/kid growth weekly • Identify common newborn problems	Pregnant females. Pen materials. Birthing kit. Tags, applicator. Castration tools. Bottles, milk. Weighing equipment. Treatment kit.

				newborn problems and apply organic-compatible interventions.	and apply organic-compatible interventions.	
GENERAL OBJECTIVE 6.0: Know organic small-ruminant health management						
9-10	6.1 Explain organic health management philosophy. 6.2 Explain common diseases of Nigerian small ruminants 6.3 Explain parasite control 6.4 Explain ethnoveterinary 6.5 Explain vaccination programmes 6.6 Explain mastitis management 6.7 Explain foot health 6.8 Explain biosecurity 6.9 Explain withdrawal periods 6.10 Explain record keeping for health events. 6.11 Explain when to use allopathic	• Explain organic health management philosophy. • Explain common diseases of Nigerian small ruminants • Explain parasite control • Explain ethnoveterinary • Explain vaccination programmes • Explain mastitis management • Explain foot health • Explain biosecurity • Explain Withdrawal Periods • Explain record keeping for health events. • Explain when to use allopathic treatment	Disease atlas, charts. FAMACHA scoring chart Textbooks Journal Computer Internet Projector.	• Vaccinate sample flock against infectious diseases using organic-permitted vaccines • Conduct faecal egg counts on sample animals; • Interpret results. • Assess FAMACHA score on each animal. • Identify those needing intervention. • Prepare and administer ethnoveterinary deworming preparation (papaya seeds, neem extract, garlic). • Conduct hoof trimming on 5	Guide students to; • Vaccinate sample flock against infectious diseases using organic-permitted vaccines • Conduct faecal egg counts on sample animals; • Interpret results. • Assess FAMACHA score on each animal; • Identify those needing intervention. • Prepare and administer ethnoveterinary deworming preparation (papaya seeds, neem extract, garlic). • Conduct hoof trimming on 5	PPR vaccine, equipment. McMaster slides, microscope. FAMACHA cards. Ethnoveterinary ingredients. Hoof trimming tools. Sick animals (with care). Quarantine area. IPM plan template. Calendar template.

	treatment			animals. • Treat foot rot with organic compliant treatment. • Identify clinical signs of common diseases on a sick animal (with supervisor). • Implement quarantine protocol for newly purchased animals. • Develop integrated parasite management plan for the institution flock. • Develop a 12-month flock-health calendar.	animals. • Treat foot rot with organic compliant treatment. • Identify clinical signs of common diseases on a sick animal (with supervisor). • Implement quarantine protocol for newly purchased animals. • Develop integrated parasite management plan for the institution flock. • Develop a 12-month flock-health calendar.	
GENERAL OBJECTIVE 7.0: Know organic goat-milk production and processing for the value-added market.						
11-12	7.1 Explain goat-milk production potential in Nigeria. 7.2 Explain dairy goat breeds 7.3 Explain lactation curve 7.4 Explain milking	• Explain goat-milk potential. • Explain dairy goat breeds. • Explain lactation curve. • Explain milking	Whiteboard, Textbooks Computer Journal Internet Projector.	• Hand milk dairy goats at the institution farm; • Weigh milk • Record yield. • Conduct milk quality tests; density	Guide students to; • Hand milk dairy goats at the institution farm; • Weigh milk; • Record yield. • Conduct milk quality tests; density	Dairy goats. Milking equipment. Quality test kit. Yoghurt incubator,

	techniques 7.5 Explain milk composition of goat vs cow 7.6 Explain milk quality testing 7.7 Explain milk storage and cold chain. 7.8 Explain goat-milk processing 7.9 Explain organic goat-milk products marketing 7.10 Explain mastitis prevention. 7.11 Explain Nigerian dairy goat case studies.	techniques. • Explain milk composition. • Explain quality testing. • Explain storage/cold chain. • Explain processing. • Explain organic marketing. • Explain mastitis prevention. • Explain Nigerian cases.		(lactometer), fat (rapid test), pH. • Process goat milk into yoghurt and soft cheese. • Store milk properly; maintain cold chain. • Design packaging for organic goat milk products. • Develop a value-chain analysis for organic goat dairy products in Nigeria. • Visit in-person a goat dairy operation.	(lactometer), fat (rapid test), pH. • Process goat milk into yoghurt and soft cheese. • Store milk properly; maintain cold chain. • Design packaging for organic goat-milk products. • Develop a value-chain analysis for organic goat dairy products in Nigeria. • Visit in-person a goat dairy operation.	cheese vats. Refrigeration. Packaging materials. Value chain template.
GENERAL OBJECTIVE 8.0: Know meat cut and marketing						
13-14	8.1 Explain slaughter and meat inspection. 8.2 Explain organic synergy. 8.3 Explain organic meat quality. 8.4 Explain ram/bull fattening. 8.5 Explain market assessment.	• Explain slaughter/inspection. • Explain organic-synergy. • Explain meat quality. • Explain ram fattening. • Explain market assessment. • Explain timing	Textbooks Journal Whiteboard Projector Computer Internet.	• Conduct ante-mortem and post-mortem inspection on small ruminants. • Practise humane organic-compliant slaughter (with supervisor). • Process carcass - cutting, weighing,	• Supervise inspection. • Supervise slaughter. • Supervise halal practice. • Supervise processing. • Supervise suya making. • Supervise kilishi making. • Guide fattening	Slaughter facility. PPE, knives. Cutting boards, packaging. Suya/kilishi ingredients. Fattening programme

	8.6 Explain Timing strategies 8.7 Explain transportation to market 8.8 Explain Meat Processing 8.9 Explain Value-Added products 8.10 Explain Hides and Skins 8.11 Explain Organic Labelling and certification compliance. 8.12 Explain Export markets.	strategies. • Explain transportation. • Explain meat processing. • Explain prime cuts • Explain value-added. • Explain hides and skins. • Explain labelling. • Explain export markets.		packaging. • Design a fattening programme. • Assess hide quality and pack for tannery. • Conduct market visit and document prices. • Develop a marketing plan for organic ram-meat	programme. • Supervise hide handling. • Coordinate market visit. • Guide marketing plan.	template. Hide storage. Transport for visit. Marketing plan template.
GENERAL OBJECTIVE 9.0: Evaluate the economic and entrepreneurial opportunities in organic small-ruminant production.						
15	9.1 Explain Economics of organic small-ruminant production 9.2 Explain cost structure 9.3 Explain Revenue streams. 9.4 Explain enterprise budgets for sheep flock, goat dairy, ram fattening. 9.5 Explain cooperative	• Explain economics of organic small-ruminant production. • Explain cost structure. • Explain cost structure • Explain revenue streams. • Explain enterprise budgets for sheep flock, goat dairy, ram fattening.	Textbook Computer Internet Journal Whiteboard Projector.	• Develop an enterprise budget for a 50-head sheep flock with 1-year horizon. • Develop an organic-goat dairy enterprise budget. • Design a cooperative structure for 30	Guide students to; • Develop an enterprise budget for a 50-head sheep flock with 1-year horizon. • Develop an organic-goat dairy enterprise budget. • Design a cooperative structure for 30	Budget templates. Cooperative design template. ICS template. Business plan template. Capstone rubric.

	models for smallholders. 9.6 Explain successful Nigerian small-ruminant cooperatives. 9.7 Explain ICS (Internal Control System) for group certification of small-ruminant cooperatives 9.8 Explain scalability 9.9 Explain financing small-ruminant ventures. 9.10 Explain livestock insurance. 9.11 Explain entrepreneurship opportunities. 9.12 Explain career pathways.	• Explain cooperative models for smallholders. • Explain successful Nigerian small-ruminant cooperatives. • Explain ICS (Internal Control System) for group certification of small-ruminant cooperatives • Explain scalability • Explain financing small-ruminant ventures. • Explain livestock insurance. • Explain entrepreneurship opportunities. • Explain career pathways.		smallholder goat farmers. • Develop an ICS manual for the cooperative. • Develop a complete business plan for an organic small-ruminant enterprise.	smallholder goat farmers. • Develop an ICS manual for the cooperative. • Develop a complete business plan for an organic small-ruminant enterprise.	

Course Assessment:
Course work: 10%
Test/Assignments: 10%
Practical: 40%
Examination: 40%

Total:	**100%**

ORGANIC MICRO-LIVESTOCK PRODUCTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC MICRO-LIVESTOCK PRODUCTION	**COURSE CODE: OAP 326**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in organic mini-livestock production		

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

1.0 Understand the role of micro-livestock in food security and entrepreneurship under organic systems;
2.0 Know organic rabbit production;
3.0 Know organic heliciculture (snail farming);
4.0 Know organic grasscutter (cane rat) production;
5.0 Know organic guinea pig production;
6.0 Know edible insect production;
7.0 Know organic-compliance for mini-livestock systems;
8.0 Know processing, value addition and marketing of micro-livestock products;
9.0 Know entrepreneurship, cooperatives and scaling models for organic micro-livestock enterprises.

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC MICRO-LIVESTOCK PRODUCTION	COURSE CODE: OAP 326	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in organic micro-livestock production.		
GENERAL OBJECTIVE 1.0: Understand the role of micro-livestock in food security and entrepreneurship under organic systems.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define micro-livestock 1.2 Explain micro-livestock advantages 1.3 Explain Nigerian micro-livestock species. 1.4 Explain nutritional value of micro-livestock products 1.5 Explain Food security contribution 1.6 Explain Economic potential of micro-	• Explain micro livestock. • Explain micro-livestock. • Explain Nigerian micro-livestock species. • Explain nutritional value. • Explain food security. • Explain economic potential of micro-livestock.	Whiteboard, projector. Reference textbooks (FAO micro -livestock manuals). Computer Journal Internet.	• Research the micro - livestock value chain for one chosen species (rabbit, snail, BSFL). • Visit in-person a micro-livestock farm (rabbits, snails, grasscutters). • Compute the potential household nutrition contribution from a 10-doe rabbit unit. • Identify three	Guide students to; • Research the micro - livestock value chain for one chosen species (rabbit, snail, BSFL). • Visit in-person a micro-livestock farm (rabbits, snails, grasscutters). • Compute the potential household nutrition contribution from a 10-doe rabbit unit. • Identify three Nigerian success	Internet, research worksheet. Discussion prompts. Transport for visit. Calculator. Success story sources.

	livestock. 1.7 Explain socio-cultural aspects. 1.8 Explain environmental. benefits. 1.9 Explain organic suitability	• Explain sociocultural aspects. • Explain environmental benefits. • Explain organic suitability.		Nigerian success stories of micro - livestock entrepreneurs.	stories of micro - livestock entrepreneurs.	
GENERAL OBJECTIVE 2.0: Know organic rabbit production						
2-3	2.1 Explain rabbit biology 2.2 Explain breeds 2.3 Explain housing 2.4 Explain breeding 2.5 Explain kindling and kit management 2.6 Explain feeding organic rabbits 2.7 Explain common diseases 2.8 Explain health management in organic. 2.9 Explain slaughter 2.10 Explain meat quality 2.11 Explain manure 2.12 Explain record-	• Explain rabbit biology. • Explain breeds. • Explain housing. • Explain breeding. • Explain kindling/kit management. • Explain feeding. • Explain common diseases. • Explain organic health. • Explain slaughter. • Explain meat quality. • Explain manure excellent fertiliser; vermiculture feed • Explain records.	Whiteboard Textbooks Journal Computer Internet Projector.	• Examine rabbits at the institutional farm; • Identify breed • Conduct sexing. • Design rabbit housing for 10 does + 2 bucks; build a model. • Conduct controlled mating; record date and pair. • Identify pregnant doe. • Provide nest box at day 28. • Care for kits after kindling • Weigh weekly.	Guide students to; • Examine rabbits at the institutional farm; • Identify breed • Conduct sexing. • Design rabbit housing for 10 does + 2 bucks; build a model. • Conduct controlled mating; record date and pair. • Identify pregnant doe. • Provide nest box at day 28. • Care for kits after kindling • Weigh weekly. • Prepare organic rabbit ration (forage +	Live rabbits. Housing materials. Nest box materials. Forage, concentrate. Treatment materials. Slaughter facility. Calendar template.

	keeping			• Prepare organic rabbit ration (forage + concentrate). • Feed organic rabbit ration (forage + concentrate). • Identify and treat common health issues (coccidiosis, ear mites) using ethnoveterinary methods. • Humanely slaughter market-ready rabbits; • Process carcasses. • Develop a complete rabbit-production calendar for a 12-month cycle.	concentrate). • Feed organic rabbit ration (forage + concentrate). • Identify and treat common health issues (coccidiosis, ear mites) using ethnoveterinary methods. • Humanely slaughter market-ready rabbits; process carcasses. • Develop a complete rabbit-production calendar for a 12-month cycle.	
GENERAL OBJECTIVE 3.0: Know organic heliciculture						
4-5	3.1 Explain snail biology. 3.2 Explain Nigerian edible snail species: 3.3 Explain habitat requirements 3.4 Explain management	• Explain snail biology. • Explain Nigerian edible snail species. • Explain habitat requirements. • Explain management	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify Nigerian edible snail species at the institution farm or sample. • Construct a snail pen (1 m² minimum) using local materials.	Guide students to; • Identify Nigerian edible snail species at the institution farm or sample. • Construct a snail pen (1 m² minimum) using	Live snails. Pen materials. Vegetables, fruits. Calcium sources. Spray bottles.

	systems 3.5 Explain breeding 3.6 Explain suitable Nigerian feed sources for snails. 3.7 Explain moisture management 3.8 Explain common problems 3.9 Explain harvest 3.10 Explain processing. 3.11 Explain marketing	systems. • Explain breeding system. • Explain Nigerian feed sources. • Explain moisture. • Explain common problems. • Explain harvest. • Explain processing. • Explain marketing.		• Introduce breeder snails (10 mature snails); • Maintain micro-climate. • Feed snails daily with rotating vegetables and fruits; • Provide calcium source. • Monitor egg-laying; • Collect eggs for incubation if separate. • Manage common problems (predators, parasites). • Harvest market-size snails; • Prepare for sale (live or processed). • Develop a value-chain analysis for organic snails in Nigeria. • Develop a snail-farm business plan for a 100 m² unit.	local materials. • Introduce breeder snails (10 mature snails); • Maintain micro-climate. • Feed snails daily with rotating vegetables and fruits; • Provide calcium source. • Monitor egg-laying; • Collect eggs for incubation if separate. • Manage common problems (predators, parasites). • Harvest market-size snails; • Prepare for sale (live or processed). • Develop a value-chain analysis for organic snails in Nigeria. • Develop a snail-farm business plan for a 100 m² unit.	Harvest baskets. Value chain template. Business plan template.

GENERAL OBJECTIVE 4.0: Know organic grasscutter (cane rat) production						
6-7	4.1 Explain grasscutter (cane rat) biology. 4.2 Explain domestication history in West Africa (Ghana, Nigeria, Bénin). 4.3 Explain housing 4.4 Explain breeding 4.5 Explain mating and parturition management. 4.6 Explain feeding by-products. 4.7 Explain organic feeding compliance. 4.8 Explain common diseases 4.9 Explain health management. 4.10 Explain marketing 4.11 Explain marketing challenges 4.12 Explain successful Nigerian grasscutter projects.	• Explain grasscutter (cane rat) biology. • Explain domestication history in West Africa (Ghana, Nigeria, Bénin). • Explain housing • Explain breeding • Explain mating and parturition management. • Explain feeding by-products. • Explain organic feeding compliance. • Explain common diseases • Explain health management. • Explain marketing • Discuss marketing challenges • Discuss successful Nigerian grasscutter projects.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Examine grasscutters at the institution farm or visit existing farm. • Build/maintain a grasscutter pen (1 m^2 per animal). • Introduce a breeding colony (1 male + 4 females); monitor. • Feed grasses, legumes, tubers daily. • Monitor parturition; care for young. • Monitor flock for health issues. • Harvest market-ready grasscutters and process • Develop a 24-month grasscutter production plan. • Develop a grasscutter enterprise business plan.	Guide students to; • Examine grasscutters at the institution farm or visit existing farm. • Build/maintain a grasscutter pen (1 m^2 per animal). • Introduce a breeding colony (1 male + 4 females); monitor. • Feed grasses, legumes, tubers daily. • Monitor parturition; care for young. • Monitor flock for health issues. • Harvest market-ready grasscutters and process. • Develop a 24-month grasscutter production plan. • Develop a grasscutter enterprise business plan.	Grasscutters (or visit). Pen materials. Grasses, tubers. Care materials. Production plan template. Business plan template.

GENERAL OBJECTIVE 5.0: Know organic guinea pig production						
8-9	5.1 Explain guinea pig biology 5.2 Explain origin and global use 5.3 Explain nutritional value 5.4 Explain housing. 5.5 Explain breeding 5.6 Explain feeding 5.7 Explain health 5.8 Explain production potential in Nigeria. 5.9 Explain marketing potential 5.10 Explain ethical considerations 5.11 Explain research-animal supply to universities, NVRI Vom modest market.	• Explain biology. • Explain origin. • Explain nutritional value. • Explain housing. • Explain breeding. • Explain feeding. • Explain health. • Explain Nigerian potential. • Explain marketing. • Explain ethics. • Explain research-animal supply.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Visit a research lab or farm with guinea pigs • Design housing for a small guinea pig unit. • Assess the Nigerian market viability for guinea pig meat. • Identify Nigerian research institutions that purchase guinea pigs as research animals. • Develop a small-scale guinea pig enterprise business plan	Guide students to; • Visit a research lab or farm with guinea pigs • Design housing for a small guinea pig unit. • Assess the Nigerian market viability for guinea pig meat. • Identify Nigerian research institutions that purchase guinea pigs as research animals. • Develop a small-scale guinea pig enterprise business plan	Transport for visit. Housing template. Market data. Research-animal supply data. Business plan template.
GENERAL OBJECTIVE 6.0: Know edible insect production						
10-11	6.1 Explain entomophagy 6.2 Explain Nigerian edible insects 6.3 Explain black soldier	• Explain entomophagy. • Explain Nigerian edible insects. • Explain BSFL.	Textbook Projector Whiteboard Marker Journal	• Set up a small BSFL cultivation unit using food waste/manure substrate. • Introduce starter	Guide students to; • Set up a small BSFL cultivation unit using food waste/manure substrate.	BSFL starter eggs/larvae. Substrate (food waste, manure). Cultivation

	fly larvae (BSFL; Hermetia illucens) 6.4 Explain BSFL life cycle 6.5 Explain BSFL production systems 6.6 Explain BSFL nutritional composition 6.7 Explain BSFL applications 6.8 Explain palm-weevil larvae (Rhynchophorus phoenicis) 6.9 Explain cricket farming 6.10 Explain marketing 6.11 Explain regulatory status of insect protein in Nigerian feed. 6.12 Explain Nigerian startups in insect farming	• Explain BSFL life cycle. • Explain BSFL production. • Explain BSFL nutrition. • Explain BSFL applications. • Explain palm-weevil larvae. • Explain cricket farming. • Explain marketing. • Explain regulatory status. • Explain Nigerian startups.	Computer Internet	BSFL eggs or larvae; manage life cycle. • Harvest pre-pupa stage larvae; dry/process for feed. • Incorporate BSFL meal in chicken feed formulation. • Cultivate palm-weevil larvae in palm log (if accessible). • Prepare insects for sample tasting (organic feed and/or human food). • Develop a BSFL business plan focused on organic-feed protein supply. • Compute the economics of BSFL and imported fish meal as protein source.	• Introduce starter BSFL eggs or larvae; manage life cycle. • Harvest pre-pupa stage larvae; dry/process for feed. • Incorporate BSFL meal in chicken feed formulation. • Cultivate palm-weevil larvae in palm log (if accessible). • Process and prepare insects for sample tasting (organic feed and/or human food). • Develop a BSFL business plan focused on organic-feed protein supply. • Compute the economics of BSFL vs imported fish meal as protein source.	containers. Drying equipment. Feed mixer. Palm log. Business plan template. Calculator.
GENERAL OBJECTIVE 7.0: Know organic compliance for micro-livestock systems.						
12-13	7.1 Explain organic compliance	• Explain organic compliance challenges	Textbook Projector	• Conduct a welfare audit on each micro -	• Conduct a welfare audit on each micro -	Welfare audit forms.

	challenges for micro-livestock 7.2 Explain welfare considerations for each species: i. Rabbits ii. Snails. iii. Grasscutters iv. BSFL 7.3 Explain organic feed compliance for micro-livestock 7.4 Explain health management compliance 7.5 Explain housing compliance 7.6 Explain certification pathways 7.7 Explain traceability for micro -livestock 7.8 Explain labelling compliance. 7.9 Explain Internal Control System (ICS) for micro - livestock cooperatives. 7.10 Explain organic	for micro-livestock • Explain welfare considerations for each species: ✓ Rabbits ✓ Snails. ✓ Grasscutters ✓ BSFL • Explain organic feed compliance for mi micro-livestock • Explain health management compliance • Explain housing compliance • Explain certification pathways • Explain traceability for micro -livestock • Explain labelling compliance. • Explain Internal Control System (ICS) for micro -livestock cooperatives. • Explain organic plus attributes that can differentiate micro	Whiteboard Marker Journal Computer Internet	livestock species at the institution farm. • Assess feed compliance for each species; • Correct any non-compliance. • Assess housing compliance; • Recommend improvements. • Develop an organic compliance plan for a chosen micro-livestock species. • Design traceability system for micro - livestock products from farm to consumer. • Design organic labelling for one micro -livestock product. • Design an ICS for a micro -livestock cooperative. • Identify organic plus differentiation for	livestock species at the institution farm. Guide students to; • Assess feed compliance for each species; • Correct any non-compliance. • Assess housing compliance; • Recommend improvements. • Develop an organic compliance plan for a chosen micro livestock species. • Design traceability system for micro - livestock products from farm to consumer. • Design organic labelling for one micro -livestock product. • Design an ICS for a micro -livestock cooperative. • Identify organic plus differentiation for marketing micro livestock products.	Feed/housing checklists. Compliance plan template. Traceability template. Labelling template. ICS template.

	plus attributes that can differentiate micro livestock products in the market	livestock products in the market		marketing micro livestock products.		
GENERAL OBJECTIVE 8.0: Know processing, value-addition and marketing of micro livestock products.						
14	8.1 Explain processing of rabbit 8.2 Explain smoking of rabbit, snail, and grasscutter 8.3 Explain snail processing 8.4 Explain grasscutter processing. 8.5 Explain BSFL processing 8.6 Explain value-added products 8.7 Explain packaging 8.8 Explain marketing channels 8.9 Explain pricing strategy 8.10 Explain export potential.	• Discuss rabbit processing. • Discuss smoking of rabbits, snail, and grasscutter. • Discuss snail processing. • Discuss grasscutter processing. • Discuss BSFL processing. • Discuss value-added products. • Discuss packaging. • Discuss marketing channels. • Discuss pricing strategy. • Discuss export potential.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Process rabbits; dressing, cutting, packaging. • Smoke rabbit and snail. • Process snails; cleaning, parboiling, frying. • Prepare a value-added product • Design organic packaging for one micro-livestock product. • Design a marketing plan for a micro-livestock value-added product. • Visit in-person a micro -livestock processor or retailer.	Guide students to; • Process rabbits; dressing, cutting, packaging. • Smoke rabbit and snail. • Process snails; cleaning, parboiling, frying. • Prepare a value-added product • Design organic packaging for one micro-livestock product. • Design a marketing plan for a micro-livestock value-added product. • Visit in-person a micro -livestock processor or retailer.	Processing equipment. Sample animals/insects. Smoking facilities. Packaging materials. Marketing plan template.

GENERAL OBJECTIVE 9.0: Know entrepreneurship, cooperatives and scaling models for organic micro **-livestock enterprises.**						
15	9.1 Explain economics of micro -livestock. 9.2 Explain enterprise budget examples 9.3 Explain scaling strategies 9.4 Explain cooperative models for micro - livestock smallholders. 9.5 Explain business models 9.6 Explain entrepreneurship opportunities 9.7 Explain financing 9.8 Explain risk management 9.9 Explain success factors. 9.10 Explain career pathways. 9.11 Explain Nigerian micro -livestock industry vision	• Discuss economics. • Discuss enterprise budgets. • Discuss scaling. • Discuss cooperative models. • Discuss business models. • Discuss entrepreneurship. • Discuss financing. • Discuss risk management. • Discuss success factors. • Discuss career pathways. • Discuss Nigerian vision.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Develop enterprise budgets for 4 micro - livestock options • Identify the most viable micro-livestock option for the student's home region. • Design a cooperative for 30 micro - livestock farmers. • Develop ICS for the cooperative. • Develop a complete business plan for an organic micro - livestock enterprise	Guide students to; • Develop enterprise budgets for 4 micro - livestock options • Identify the most viable micro-livestock option for the student's home region. • Design a cooperative for 30 micro -livestock farmers. • Develop ICS for the cooperative. • Develop a complete business plan for an organic micro - livestock enterprise	Budget templates. Cooperative design template. ICS template. Business plan template. Capstone rubric. Projector.
Course Assessment: Course work: 10%						

Test/Assignments:	10%
Practical:	40%
Examination:	40%
Total:	**100%**

INDIGENOUS BREEDS AND CONSERVATION GENETICS

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: INDIGENOUS BREEDS AND CONSERVATION GENETICS	**COURSE CODE: OAP 327**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: I	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with deep knowledge of Nigerian indigenous livestock breeds		

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

1.0 Understand livestock genetic biodiversity;
2.0 Know Nigerian local cattle breeds;
3.0 Know Nigerian local small ruminants;
4.0 Know Nigerian local pigs;
5.0 Know Nigerian local poultry;
6.0 Understand the genetics of adaptation;
7.0 Know Mendelian and population genetics principles to livestock improvement;
8.0 Know exotic breeds (cattle, pigs, poultry, sheep, goat and micro-livestock) and breeding strategies suitable for organic systems;
9.0 Know conservation genetics methods.

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: INDIGENOUS BREEDS AND CONSERVATION GENETICS	COURSE CODE: OAP 327	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This new course is designed to equip students with deep knowledge of Nigerian indigenous livestock breeds.		
GENERAL OBJECTIVE 1.0: Understand livestock genetic biodiversity		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define bio-diversity at three levels 1.2 Explain animal genetic resources (AnGR) 1.3 Describe global livestock bio-diversity 1.4 Describe Africa's livestock bio-diversity 1.5 Explain threats to	• Explain bio-diversity at three levels — genetic, species, ecosystem. • Explain animal genetic resources (AnGR) • Explain global livestock bio-diversity • Explain Africa's livestock bio-diversity	Textbook Projector Whiteboard Marker Journal Computer Internet	• Survey the institution farm and surrounding villages for indigenous and exotic breeds; document numbers. • Access DAD-IS database to review Nigerian breed entries. • Develop a breed-at-risk register for Nigeria using	Guide students to; • Survey the institution farm and surrounding villages for indigenous and exotic breeds; document numbers. • Access DAD-IS database; review Nigerian breed entries. • Develop a breed-at-risk register for	Survey forms. Computer with internet. DAD-IS database. Transport for market visit.

	livestock bio-diversity 1.6 Describe IFOAM/NOAN preference for indigenous breeds in organic systems 1.7 Describe ecosystem services from livestock biodiversity 1.8 Describe Domestic Animal Diversity Information System (DAD-IS). 1.9 Describe Nigerian AnGR status	• Explain threats to livestock bio-diversity • Explain IFOAM/NOAN preference for indigenous breeds in organic systems • Explain ecosystem services from livestock biodiversity • Explain Domestic Animal Diversity Information System (DAD-IS). • Explain Nigerian AnGR status — some breeds (Muturu, Kuri, native chicken) at risk; need for conservation.		available data. • Visit a livestock market to identify and count breeds offered.	Nigeria using available data. • Visit a livestock market to identify and count breeds offered.	
GENERAL OBJECTIVE 2.0: Know Nigerian local cattle breeds						
2-3	2.1 Describe White Fulani. 2.2 Describe N'Dama. 2.3 Describe Muturu. 2.4 Describe Sokoto Gudali.	• Explain White Fulani. • Explain N'Dama. • Explain Muturu. • Explain Sokoto Gudali.	Textbook Projector Whiteboard Marker Journal Computer	• Identify Nigerian cattle breeds from photos and live animals. • Conduct morphometric	Guide students to; • Identify Nigerian cattle breeds from photos and live animals. • Conduct	Photos, Live Cattle. Measuring tape, Weighing scale. Interview

	2.5 Describe Kuri. 2.6 Describe Adamawa Gudali. 2.7 Describe Wadara. 2.8 Describe Keteku. 2.9 Describe other breeds. 2.10 Explain phenotypic characterisation. 2.11 Explain their adaptations 2.12 Explain their productive traits.	• Explain Kuri. • Explain Adamawa Gudali. • Explain Wadara. • Explain Keteku. • Explain other breeds. • Explain phenotypic characterisation. • Explain their adaptations • Explain their productive traits.	Internet	measurements (height at withers, body length, heart girth) on available cattle; • Estimate weight. • Conduct breed characterisation interview with a Fulani pastoralist (in person or virtual). • Examine breed distribution map of Nigeria; • Correlate with agro-ecological zones. • Visit a national breed institution (NAPRI Shika) for genetic resource collection. • Identify which Nigerian breed is most suitable for an organic dairy farm	morphometric measurements (height at withers, body length, heart girth) on available cattle; • Estimate weight. • Conduct breed characterisation interview with a Fulani pastoralist (in person or virtual). • Examine breed distribution map of Nigeria; • Correlate with agro-ecological zones. • Visit a national breed institution (NAPRI Shika) for genetic resource collection. • Identify which Nigerian breed is most suitable for an organic dairy farm	guide. Distribution maps. Transport for visit. Case-study scenarios.
GENERAL OBJECTIVE 3.0: Know Nigerian local small ruminants						
4-5	3.1 Describe West African Dwarf	• Explain West African Dwarf (Wad) Goat	Textbook Projector	• Identify breeds. • Conduct	Guide students to: • Identify breeds.	Live small ruminants,

	(Wad) Goat 3.2 Describe Sahel (Maradi) Goat. 3.3 Describe Kano Brown Goat / Red Sokoto 3.4 Describe other goats: Borno White, Bornu Red. 3.5 Describe West African Dwarf (Wad) Sheep 3.6 Describe Yankasa Sheep 3.7 Describe Balami Sheep 3.8 Describe ouda (Uda) and other variants. 3.9 Describe productive traits 3.10 Describe distinctive adaptations	• Explain Sahel (Maradi) Goat. • Explain Kano Brown Goat / Red Sokoto • Explain other goats: Borno White, Bornu Red. • Explain West African Dwarf (Wad) Sheep • Explain Yankasa Sheep • Explain Balami Sheep • Describe ouda (Uda) and other variants. • Explain productive traits • Discuss distinctive adaptations	Whiteboard Marker Journal Computer Internet	morphometrics. • Examine characteristics. • Conduct suitability assessment. • Conduct dentition ageing.	• Conduct morphometrics. • Examine characteristics. • Conduct suitability assessment. • Conduct dentition ageing.	Photos. Measuring tape, Scale. Identification guides. Suitability scenarios. Mouth gag for dentition. Transport for visit.
GENERAL OBJECTIVE 4.0: Know Nigerian local pigs						
6-7	4.1 Describe Nigerian Indigenous Pigs 4.2 Describe productive traits	• Explain Nigerian indigenous pigs. • Explain pig productive traits.	Textbook Projector Whiteboard Marker	• Identify Nigerian indigenous pig types.	Guide students to: • Identify pigs.	Live animals, photos. Measuring tape, Scale.

	4.3 Describe crosses	• Explain Crosses	Journal Computer Internet			Identification guides. Sample eggs. Transport for visit. Improvement plan template.
GENERAL OBJECTIVE 5.0 Know Nigeria local Poultry						
	5.1 Describe native chicken 5.2 Describe FUNAAB Alpha. Shika brown Fulani ecotype Noiler. 5.3 Describe crosses. 5.4 Explain Muscovy duck. 5.5 Describe indigenous duck. 5.6 Describe guinea fowl. 5.7 Describe local turkey. 5.8 Describe their adaptations. 5.9 Describe their institutions.	• Explain native chicken. • Explain FUNAAB Alpha. Shika brown Fulani ecotype Noiler. • Explain crosses. • Explain Muscovy duck. • Explain indigenous duck. • Explain guinea fowl. • Explain local turkey. • Explain their adaptations. • Explain their institutions	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct morphometric assessment on indigenous chickens (weight, length, comb size). • Examine FUNAAB Alpha or Noiler chicks; • Compare growth with local chicks. • Visit a Nigerian indigenous poultry hatchery • Assess broodiness in local hens	Guide students to; • Conduct morphometric assessment on indigenous chickens (weight, length, comb size). • Examine FUNAAB Alpha or Noiler chicks; • Compare growth with local chicks. • Visit a Nigerian indigenous poultry hatchery • Assess broodiness in local hens	Live animals, photos. Measuring tape, Scale. Identification guides. Sample eggs. Transport for visit. Improvement plan template.
GENERAL OBJECTIVE 6.0: Understand the genetics of adaptation of Ruminants						

8-9	6.1 Define adaptation, fitness, natural selection, artificial selection. 6.2 Describe heat tolerance genetics 6.3 Describe disease resistance genetics 6.4 Describe foraging / digestive efficiency 6.5 Describe behavioural adaptations 6.6 Describe reproductive adaptations 6.7 Describe polymorphisms. 6.8 Describe molecular tools. 6.9 Describe gene-environment interactions 6.10 Describe potential gene editing.	• Define adaptation concepts. • Explain heat tolerance. • Explain disease resistance. • Explain feed and foraging efficiency. • Explain behavioural adaptations. • Explain reproductive adaptations. • Explain polymorphisms. • Explain molecular tools — PCR, sequencing, GWAS, genomic selection (introductory). • Explain G×E interactions. • Discuss gene editing concerns.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Measure body temperature of cattle, sheep and goat at peak heat; • Compare local and exotic. • Conduct hair-coat sampling; • Measure hair length and density; • Compare breeds. • Conduct dipstick examination for parasitic burden; • Compare breeds for natural resistance. • Examine published trypanotolerance trial data; • Interpret breed differences. • Visit a research institution (NITR, NVRI, ILRI, NAPRI) using molecular tools. • Select a Nigerian breed for an organic enterprise based on	Guide students to: • Measure body temperature. • Sample hair coat. • Examine parasite burden. • Interpret trial data. • Visit research institution. • Select breed.	Thermometers. Hair-sampling materials. Dipstick or microscopy. Trial data handouts. Transport for visit. Selection worksheets.

				adaptive traits required.		
GENERAL OBJECTIVE 7.0: Know Mendelian and population genetics principles to livestock improvement.						
10-11	7.1 Explain Mendelian genetics 7.2 Describe linkage and crossing-over. 7.3 Describe sex-linked, sex-influenced, sex-limited inheritance. 7.4 Describe population genetics. 7.5 Describe heritability (H^2) 7.6 Describe heritability of key traits 7.7 Describe selection differential, response to Selection ($R = H^2 \times S$), Generation Interval. 7.8 Describe breeding value. 7.9 Describe inbreeding and inbreeding coefficient 7.10 Describe line	• Discuss Mendelian genetics. • Explain linkage. • Explain sex-linked. • Explain population genetics. • Explain heritability. • Explain heritability values. • Explain breed selection Differential, Response To Selection ($R = H^2 \times S$), Generation Interval. • Explain breeding value. • Explain inbreeding • Explain breeding systems • Explain selection methods. • Explain genomic selection.	Charts of genetics concepts. Reference textbooks. Worked examples. Projector, whiteboard.	• Solve Mendelian cross problems for cattle coat colour, polled trait, horn shape. • Calculate allele and genotype frequencies from sample population. • Calculate selection differential and response to selection from sample data. • Calculate inbreeding coefficient from sample pedigree. • Construct a simple breeding pedigree for an indigenous cattle herd. • Compute economic gain from selection over 5 generations. • Design a within-breed selection programme	Guide students to; • Solve Mendelian cross problems for cattle coat colour, polled trait, horn shape. • Calculate allele and genotype frequencies from sample population. • Calculate selection differential and response to selection from sample data. • Calculate inbreeding coefficient from sample pedigree. • Construct a simple breeding pedigree for an indigenous cattle herd. • Compute economic gain from selection over 5 generations. • Design a within-breed	Calculator, worked-example handouts. Pedigree paper. Sample population data. Selection programme template.

	breeding, crossbreeding 7.11 Describe mass, individual, family, pedigree, progeny-Test selection. 7.12 Describe genomic selection (introductory).			for shika brown	selection programme for shika brown	
GENERAL OBJECTIVE 8.0: Know exotic breeds (cattle, pigs, poultry, sheep, goat and micro-livestock) and breeding strategies suitable for organic system						
12-13	8.1 Describe IFOAM and NOAN positions on reproductive technology 8.2 Describe natural service. 8.3 Explain sire selection. 8.4 Describe heat detection. 8.5 Explain Artificial Insemination (AI) under organic permissibility. 8.6 Explain nucleus breeding schemes	• Explain IFOAM and NOAN positions on reproductive technology • Explain natural service. • Explain sire selection. • Explain heat detection. • Explain Artificial Insemination (AI) under organic permissibility. • Explain nucleus breeding schemes • Explain open	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify breeding sires in the institutional herd • Conduct heat detection on a cow/doe/ewe over 1 week; • Record signs. • Observe AI procedure (or simulation) on a cow. • Examine semen under microscope; assess motility and concentration. • Design a breeding plan for an organic	Guide students to; • Identify breeding sires in the institutional herd • Conduct heat detection on a cow/doe/ewe over 1 week; • Record signs. • Observe AI procedure (or simulation) on a cow. • Examine semen under microscope; assess motility and concentration. • Design a breeding	Live animals, pedigree records. Heat-detection materials. AI equipment, semen sample. Microscope. Breeding plan template. Transport for visit. Record-keeping forms.

	8.7 Describe open nucleus schemes nucleus. 8.8 Explain community-based / Participatory breeding 8.9 Describe Group Breeding Scheme (GBS) 8.10 Describe Nigerian breeding programmes 8.11 Describe importance of Record-Keeping 8.12 Describe organic-compliant breeding documentation requirements.	nucleus schemes nucleus; superior genetics flow back. • Explain community-based / Participatory breeding. • Explain Group Breeding Scheme (GBS). • Explain Nigerian breeding programmes. • Explain importance of record-keeping. • Explain organic-compliant breeding documentation requirements.		20-cow herd using natural service. • Visit a community-based breeding programme or research institution. • Develop record-keeping forms for breeding events (mating, pregnancy, parturition).	plan for an organic 20-cow herd using natural service. • Visit a community-based breeding programme or research institution. • Develop record-keeping forms for breeding events (mating, pregnancy, parturition).	
GENERAL OBJECTIVE 9.0: Know conservation genetics methods						
14-15	9.1 Define conservation genetics 9.2 Explain In-Situ Conservation 9.3 Describe Ex-Situ Live Conservation 9.4 Describe Ex-Situ	• Discuss conservation genetics • Explain In-Situ Conservation • Explain Ex-Situ Live Conservation	Textbook Projector Whiteboard Marker Journal Computer Internet	• Visit a Nigerian gene bank or cryopreservation facility (NAPRI, NAGRAB). • Examine semen straws under	Guide students to; • Visit a Nigerian gene bank or cryopreservation facility (NAPRI, NAGRAB). • Examine semen	Transport for visit. Microscope, slides. Sampling materials, storage tubes.

	Cryopreservation 9.5 Explain Semen Cryopreservation. 9.6 Describe Embryo Cryopreservation 9.7 Explain Oocyte and somatic cell cryopreservation 9.8 Describe DNA Banking. 9.9 Explain IFOAM/NOAN position 9.10 Describe FAO Global Plan of Action for AnGR (2007). 9.11 Describe National Gene Bank for Animal Genetic Resources (Nigeria) at NIAS / FMLD. 9.12 Explain role of community in in-situ conservation. 9.13 Describe pasture-based extensive systems as conservation	• Explain Ex-Situ Cryopreservation • Explain Semen Cryopreservation. • Explain Embryo Cryopreservation • Explain Oocyte and Somatic Cell cryopreservation • Explain DNA Banking. • Explain IFOAM/NOAN position • Discuss FAO Global Plan of Action for AnGR (2007). • Explain National Gene Bank for Animal Genetic Resources (Nigeria) at NIAS / FMARD • Explain role of community in in-situ conservation. • Discuss pasture-based extensive systems as		microscope after thawing; • Assess viability. • Collect blood/hair samples for DNA banking; • Design an in-situ conservation programme for Muturu cattle. • Develop a community-based conservation strategy for native chicken landraces. • Compute the minimum effective population size (Ne) for a sustainable indigenous herd.	straws under microscope after thawing; • Assess viability. • Collect blood/hair samples for DNA banking; • Design an in-situ conservation programme for Muturu cattle. • Develop a community-based conservation strategy for native chicken landraces. • Compute the minimum effective population size (Ne) for a sustainable indigenous herd.	Programme template. Strategy template. Calculator, sample data.

	strategy.	conservation strategy.				

COURSE ASSESSMENT:

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

YEAR II – SEMESTER I

ORGANIC ANIMAL HEALTH MANAGEMENT

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC ANIMAL HEALTH MANAGEMENT	**COURSE CODE: OAP 411**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in maintaining herd and flock health under organic standards		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Comprehend the IFOAM Principle of Health and the prevention; 2.0 Know the application of biosecurity to organic livestock enterprises; 3.0 Understand internal and External parasites under organic standards using FAMACHA, refugia and rotational grazing; 4.0 Know the prevention mastitis and reproductive disorders in organic dairy and breeding stock; 5.0 Understand vaccination policy and approved treatments under organic certification; 6.0 Know the identification and prevention of lameness, metabolic and production diseases; 7.0 Know herd-health planning compliance with NOAN, EU and USDA NOP standards; 8.0 Know the application of One Health and AMR-stewardship principles to organic livestock practice.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC ANIMAL HEALTH MANAGEMENT	COURSE CODE: OAP 411	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in maintaining herd and flock health under organic standards		
GENERAL OBJECTIVE 1.0: Comprehend the IFOAM Principle of Health and the Prevention		

	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 animal health management. 1.2 List the IFOAM Principle of Health. 1.3 Distinguish between prevention-focused and treatment focused animal health paradigms. 1.4 Describe prohibitions under EU 2018/848, USDA NOP (p 205-238) and NOAN standards. 1.5 Explain permitted	• Explain organic animal health management. • State the IFOAM Principle of Health. • Explain the differences between prevention-focused and treatment focused animal health paradigms. • Discuss prohibitions under EU 2018/848, USDA NOP (p 205-238) and NOAN standards. • Explain permitted	Textbook Projector Whiteboard Marker Journal Computer Internet	• Map permitted against prohibited treatments for organic livestock onto a one-page reference chart. • Visit a certified or transitioning organic livestock farm in the local area; • Document the health management practices observed. • Compile the IFOAM, NOAN, EU and USDA NOP rules on animal health into a comparative table.	Guide students to; • Map permitted against prohibited treatments for organic livestock onto a one-page reference chart. • Visit a certified or transitioning organic livestock farm in the local area; • Document the health management practices observed. • Compile the IFOAM, NOAN, EU and USDA NOP rules on animal health into a comparative table.	Chart template. Farm access. Standards documents. Case study.

	treatments: phytotherapy, homeopathy, vitamins, minerals, vaccines (with restrictions), curative antibiotics (with doubled withdrawal). 1.6 Explain welfare-as-health: stocking density, outdoor access, social grouping, behavioral needs 1.7 Describe the One Health relevance of organic livestock and antimicrobial stewardship. 1.8 Outline the role of the OAP technologist in herd-health planning and certification audit.	treatments: phytotherapy, homeopathy, vitamins, minerals, vaccines (with restrictions), curative antibiotics (with doubled withdrawal). • Explain welfare-as-health: stocking density, outdoor access, social grouping, behavioral needs • Discuss the One Health relevance of organic livestock and antimicrobial stewardship. • Outline the role of the OAP technologist in herd-health planning and certification audit.				
GENERAL OBJECTIVE 2.0: Know the application of bio-security to organic livestock enterprises.						
3-4	2.1 Define bio-security in the organic context (bio-exclusion and bio-containment).	• Explain bio-security in the organic context (bio-exclusion and bio-	Textbook Projector Whiteboard Marker Journal	• Audit a livestock unit using a bio-security scoring checklist. • Compose a written bio-security plan for a 50-	Guide students to; • Audit a livestock unit using a bio-security scoring checklist. • Compose a written bio-	Audit checklist. Plan template. Peracetic

	2.2 Explain on-farm bio-security zones: clean transition, dirty areas. 2.3 Explain site identification and application of perimeter measures: fencing, controlled entry, visitor log, footbaths etc. 2.4 Describe risk pathways; incoming stock, feed, water, equipment, vectors, wildlife etc. 2.5 Differentiate organic bio-security from conventional (no routine antimicrobials; reliance on environment).	containment). • Discuss on-farm bio-security zones: • Clean transition, • Dirty areas. • Explain site identification and application of perimeter measures: • Fencing, controlled entry, • Visitor log, • Footbaths. • Discuss risk pathways: incoming stock, feed, water, equipment, vectors, wildlife. • Differentiate organic bio-security from conventional (no routine antimicrobials; reliance on environment).	Computer Internet	sow organic pig unit. • Demonstrate preparation of a peracetic-acid disinfection solution. • Devise a quarantine protocol for incoming organic dairy heifers. • Examine quarantine of incoming stock (14 days minimum) with screening (Brucella, TB, parasites). • Recognize organic-permitted disinfectants: lime, hydrogen peroxide, peracetic acid, hot water, steam, citric acid; restricted: glutaraldehyde, quaternary ammonium, chlorine. • Apply all-in-all-out management for poultry/swine. • Maintain a written bio-security plan as an audit-compliance requirement.	security plan for a 50-sow organic pig unit. • Demonstrate preparation of a peracetic-acid disinfection solution. • Devise a quarantine protocol for incoming organic dairy heifers. • Examine quarantine of incoming stock (14 days minimum) with screening (Brucella, TB, parasites). • Recognize organic-permitted disinfectants: lime, hydrogen peroxide, peracetic acid, hot water, steam, citric acid; restricted: glutaraldehyde, quaternary ammonium, chlorine. • Apply all-in-all-out management for poultry/swine. • Maintain a written bio-security plan as an audit-compliance requirement.	acid. Protocol template.
GENERAL OBJECTIVE 3.0: Understand internal and external parasites under organic standards using FAMACHA, refugia and						

rotational grazing.						
5-6	3.1 Explain the major internal parasites of Nigerian organic livestock 3.2 Highlight parasite life cycles 3.3 Explain frequent synthetic anthelmintic use prohibited under organic certification (EU 2018/848; selective treatment only). 3.4 Explain common ectoparasites 3.5 Explain economic and disease-vector importance 2.6 Outline restrictions on synthetic pyrethroids	• Explain the major internal parasites of Nigerian organic livestock • Outline parasite life cycles. • Discuss frequent synthetic anthelmintic use prohibited under organic certification (EU 2018/848; selective treatment only). • Discuss ectoparasites. • Explain economic and disease-vector importance. • Outline restrictions on synthetic pyrethroids. •	Textbook Projector Whiteboard Marker Journal Computer Internet	• Score FAMACHA on 20 sheep/goats. • Execute McMaster FEC on small-ruminant and cattle faecal samples; • Calculate egg per gram. • Identify common helminth eggs under microscope. • Design a rotational grazing plan with sufficient rest periods for a 50-ewe flock. • Compose a refugia-management protocol. • Prepare neem leaf decoction; • Document dose, frequency and species. • Identify common ectoparasites collected from farm animals under microscope. • Prepare neem-oil tick-control spray. • Examine an animal for tick infestation;	Guide students to; • Score FAMACHA on 20 sheep/goats. • Execute McMaster FEC on small-ruminant and cattle faecal samples; • Calculate egg per gram. • Identify common helminth eggs under microscope. • Design a rotational grazing plan with sufficient rest periods for a 50-ewe flock. • Compose a refugia-management protocol. • Prepare neem leaf decoction; • Cocument dose, frequency and species. • Identify common ectoparasites collected from farm animals under microscope. • Prepare neem-oil tick-control spray. • Examine an animal for tick infestation; • Remove ticks	FAMACHA cards. Faecal samples, McMaster. Microscope, slides. Plan template. Parasites. Protocol template. Neem leaves. Farm access.

				• Remove ticks manually. • Compose an ectoparasite IPM plan for an organic cattle ranch. • Maintain a parasite-treatment record for one week. • Apply permitted control methods: neem-oil sprays, citrus-peel oil, sulphur dusts, diatomaceous earth, lime baths. • Use biological control: tick-eating birds (cattle egret), entomopathogenic fungi. • Apply pasture management: spelling pastures (months without livestock) reduces tick burden. • Use selective tick-resistant breeds. • Implement integrated pest management (IPM) on organic farms. • Maintain detailed	manually. • Compose an ectoparasite IPM plan for an organic cattle ranch. • Maintain a parasite-treatment record for one week. • Apply permitted control methods: neem-oil sprays, citrus-peel oil, Sulphur dusts, diatomaceous earth, lime baths. • Use biological control: tick-eating birds (cattle egret), entomopathogenic fungi. • Apply pasture management: spelling pastures (months without livestock) reduces tick burden. • Use selective tick-resistant breeds. • Implement integrated pest management (IPM) on organic farms. • Maintain detailed records of ectoparasite	

				records of ectoparasite treatments for certification audit • Visit a Nigerian organic farm; document the parasite-management approach in use.	treatments for certification audit • Visit a Nigerian organic farm; document the parasite-management approach in use.	
GENERAL OBJECTIVE 4.0: Know the prevention of mastitis and reproductive disorders in organic dairy and breeding stock.						
7-8	4.1 Define mastitis; distinguish clinical from sub-clinical. 4.2 Explain organic-permitted mastitis prevention. 4.3 Explain restriction on routine antibiotic dry-cow therapy under organic standards (selective only). 4.4 Explain reproductive disorders: dystocia, retained placenta, metritis, anoestrus, repeat breeders. 4.5 Explain approved reproductive interventions and prohibited hormones.	• Explain mastitis; distinguish clinical from sub-clinical. • Explain organic-permitted mastitis prevention. • Discuss restriction on routine antibiotic dry-cow therapy under organic standards (selective only). • Identify reproductive disorders: dystocia, retained placenta, metritis, anoestrus, repeat breeders. • Identify approved reproductive interventions and prohibited hormones.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Perform CMT on quarters of an institution dairy cow. • Compose an organic milking SOP including pre/post-dip. • Examine a dairy herd record • Identify mastitis risk factors. • Prepare an herbal teat-cream sample. • Investigate Nigerian dairy mastitis prevalence in indigenous breeds. • Conduct California Mastitis Test (CMT) cow-side for early detection. • Calculate Somatic Cell Count thresholds	Guide students to; • Perform CMT on quarters of an institution dairy cow. • Compose an organic milking SOP including pre/post-dip. • Examine a dairy herd record • Identify mastitis risk factors. • Prepare an herbal teat-cream sample. • Investigate Nigerian dairy mastitis prevalence in indigenous breeds. • Conduct California Mastitis Test (CMT) cow-side for early detection. • Calculate Somatic	CMT kit, milk. SOP template. Herd records. Herbal ingredients. Research access.

				(< 200,000/mL bulk-tank is target). • Apply phytotherapy for mastitis support: garlic, propolis, herbal teat creams. • Apply prevention: body condition score management, pre-calving nutrition, clean calving environment. • Examine the role of natural service vs AI under organic standards.	Cell Count thresholds (< 200,000/mL bulk-tank is target). • Apply phytotherapy for mastitis support: garlic, propolis, herbal teat creams. • Apply prevention: body condition score management, pre-calving nutrition, clean calving environment. • Examine the role of natural service vs AI under organic standards.	
GENERAL OBJECTIVE 5.0: Understand vaccination policy and approved treatments under organic certification.						
9-10	5. 1 Explain the organic vaccination policy 5. 2 Describe mandatory vaccines for Nigerian livestock 5. 3 Explain GMO vaccine restrictions in some organic standards (EU permits non-GMO vaccines). 5. 4 Differentiate prophylactic from curative use	• Discuss the organic vaccination policy • Discuss mandatory vaccines for Nigerian livestock • Discuss GMO vaccine restrictions in some organic standards (EU permits non-GMO vaccines). • Distinguish prophylactic from curative use	Textbook Projector Whiteboard Marker Journal Computer Internet	• Profile 5 Nigerian-licensed veterinary vaccines. • Identify organic-permission status. • Reconstitute a freeze-dried PPR vaccine. • Maintain a sample organic treatment register for one week. • Compose a vaccination schedule for a 100-head organic cattle herd in Nigeria	Guide students to; • Profile 5 Nigerian-licensed veterinary vaccines. • Identify organic-permission status. • Reconstitute a freeze-dried PPR vaccine. • Maintain a sample organic treatment register for one week. • Compose a vaccination schedule for a 100-head organic cattle	Vaccine list. Vaccine, diluent. Register template. Schedule template.

	5. 5 Explain homeopathy and phytotherapy as first-line treatments under organic standards. 5. 6 Outline the consequences of misuse for organic certification status.	• Explain homeopathy and phytotherapy as first-line treatments under organic standards. • Outline the consequences of misuse for organic certification status.		• Apply cold-chain principles for vaccine handling. • Examine the role of Nigerian institutions: NVRI Vom (vaccine production), VCN, FMLD. • Maintain treatment records: drug name, dose, date, withdrawal applied, justification.	herd in Nigeria • Apply cold-chain principles for vaccine handling. • Examine the role of Nigerian institutions: NVRI Vom (vaccine production), VCN, FMLD. • Maintain treatment records: drug name, dose, date, withdrawal applied, justification.	
GENERAL OBJECTIVE 6.0: Know the identification and prevention of lameness, metabolic and production diseases.						
11-12	6.1 Explain common lameness causes 6.2 Explain organic-permitted foot care 6.3 Explain metabolic disorders 6.4 Explain the application of preventive nutrition 6.5 Explain mineral deficiencies in Nigerian soils/forages (Cu, Zn, Se, Co) 6.6 Explain production diseases. 6.7 Explain welfare-focused husbandry	•Discuss common lameness causes •Discuss organic-permitted foot care •Discuss metabolic disorders •Discuss the application of preventive nutrition •Discuss mineral deficiencies in Nigerian soils/forages (Cu, Zn, Se, Co) •Discuss production diseases. •Discuss welfare-focused husbandry	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct hoof trimming on a sheep or goat (under supervision). • Prepare a permitted zinc-sulphate footbath. • Score body condition on 10 animals. • Identify mineral-deficiency signs in 5 case images. • Compose a metabolic-disease prevention plan for a transition dairy cow.	Guide students to; • Conduct hoof trimming on a sheep or goat (under supervision). • Prepare a permitted zinc-sulphate footbath. • Score body condition on 10 animals. • Identify mineral-deficiency signs in 5 case images. • Compose a metabolic-disease prevention plan for a transition dairy cow.	Hoof tools. Zinc sulphate. BCS charts. Case images. Plan template.

	6.8 Explain zoonotic risks 6.9 Explain heat-stress prevention for tropical organic herds	• Discuss zoonotic risks • Discuss heat-stress prevention for tropical organic herds				
GENERAL OBJECTIVE 7.0: Know herd-health plan compliant with NOAN, EU and USDA NOP standards.						
13-14	7.1 Outline the legal requirement for a written animal health plan under most organic standards 7.2 Describe mandatory plan components 7.3 Outline monitoring KPIs 7.4 Distinguish between farm level and regional level outbreak response	• Discuss the legal requirement for a written animal health plan under most organic standards. • Discuss mandatory plan components • Outline monitoring KPIs • Explain the differences between farm level and regional level outbreak response	Plan templates. Organic standards. Reference textbooks. Projector.	• Compose a complete herd-health plan for a chosen species under organic standards. • Run a sample annual review on a previous year's plan. • Maintain a treatment register with audit trail. • Investigate Nigerian certified organic farms' health-management practices. • Compose a herd-health plan for a 100-head organic dairy herd. • Compose a flock-health plan for an organic small-ruminant operation. • Compose a poultry-health plan for an organic free-range layer operation.	Guide students to; • Compose a complete herd-health plan for a chosen species under organic standards. • Run a sample annual review on a previous year's plan. • Maintain a treatment register with audit trail. • Investigate Nigerian certified organic farms' health-management practices. • Compose a herd-health plan for a 100-head organic dairy herd. • Compose a flock-health plan for an organic small-ruminant operation. • Compose a poultry-health plan for an organic free-range layer operation.	Plan template. Sample plan. Register. Research access.

GENERAL OBJECTIVE 8.0: Know the application of One Health and AMR-stewardship principles to organic livestock practice.						
15	8.1 Explain the One Health concept linking human, animal and environmental health. 8.2 Explain organic livestock as an AMR-stewardship pathway 8.3 Describe major zoonoses of Nigerian organic livestock interest 8.4 Describe the Nigerian National Action Plan on AMR. 8.5 Explain the premium-market advantage of certified organic livestock for AMR-conscious consumers. 8.6 Explain probiotics and prebiotics as alternative to AMR	• Explain the One Health concept linking human, animal and environmental health. • Explain organic livestock as an AMR-stewardship pathway • Describe major zoonoses of Nigerian organic livestock interest • Describe the Nigerian National Action Plan on AMR. • Explain the premium-market advantage of certified organic livestock for AMR-conscious consumers. • Explain probiotics and prebiotics as alternative to AMR	One Health reference. AMR reports. Case studies. Reference textbooks. Projector.	• Conduct 3 herd-health case-study analyses. • Submit the capstone herd-health plan. • Set the final integrated practical and written assessment. • Apply bio-safety in handling livestock for the technologist. • Prepare and use probiotics and prebiotics as alternative to AMR.	Guide students to • Conduct 3 herd-health case-study analyses. • Submit the capstone herd-health plan. • Set the final integrated practical and written assessment. • Apply bio-safety in handling livestock for the technologist. • Prepare and use probiotics and prebiotics as alternative to AMR.	Case study materials. Plan rubric. Assessment.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10%						

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

ORGANIC PASTURE AND RANGE MANAGEMENT II

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC PASTURE AND RANGE MANAGEMENT II	**COURSE CODE: OAP 412**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in pasture and rangeland management under organic principles in Nigeria		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Comprehend Nigerian rangeland ecology and the principles of organic pasture management; 2.0 Know organic pastures using mixed grass-legume swards without synthetic fertilisers; 3.0 Understand rotational, mob and Adaptive Multi-Paddock (AMP) grazing systems; 4.0 Know the application of silvopasture and agro-forestry to organic livestock systems; 5.0 Know pasture quality, biomass and carrying capacity; 6.0 Know forage, hay, haylage, silage and standing-hay systems under organic standards; 7.0 Know range degradation, encroachment and invasive plant species; 8.0 Know carbon sequestration and climate benefits of organic pastures; 9.0 Know the application of pasture-based parasite control; 10.0 Understand conflict mitigation in Nigerian pastoralist contexts.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC PASTURE AND RANGE MANAGEMENT II	COURSE CODE: OAP 412	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in pasture and rangeland management under organic principles in Nigeria		
GENERAL OBJECTIVE 1.0: Comprehend Nigerian rangeland ecology and the principles of organic pasture management.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Define pasture, rangeland, savannah and grassland. 1.2 Describe Nigerian agro-ecological zones 1.3 Describe rangeland types: natural, semi-natural, sown, native, improved. 1.4 Distinguish organic from conventional pasture management. 1.5 Outline NOAN, EU and USDA NOP	• Explain pasture, rangeland, savannah and grassland. • Discuss Nigerian agro-ecological zones • Explain rangeland types: natural, semi-natural, sown, native, improved. • Differentiate organic from conventional pasture management.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Tour the institution pasture • Identify native grasses and legumes. • Map Nigerian agro-ecological zones • Identify key Nigerian native grass species: Andropogon gayanus, Hyparrhenia rufa, Pennisetum spp., Cynodon spp. Brachiaria spp. • Identify Nigerian native legumes: Stylosanthes spp., Centrosema pubescens, Calopogonium mucunoides, Pueraria phaseoloides, Mucuna spp	Guide students to; • Tour the institution pasture • Identify native grasses and legumes. • Map Nigerian agro-ecological zones • Identify key Nigerian native grass species: Andropogon gayanus, Hyparrhenia rufa, Pennisetum spp., Cynodon spp. Brachiaria spp. • Identify Nigerian native legumes: Stylosanthes spp., Centrosema pubescens, Calopogonium mucunoides, Pueraria	Pasture access. Country map. Comparison template. Discussion materials.

	pasture rules.	• Explain NOAN, EU and USDA NOP pasture rules.		• Compose a comparison table between organic and conventional pasture management. • Trace the IFOAM Principle of Ecology applied to pasture.	phaseoloides, Mucuna spp • Compose a comparison table between organic and conventional pasture management. • Trace the IFOAM Principle of Ecology applied to pasture.	
GENERAL OBJECTIVE 2.0: Know organic pastures using mixed grass-legume swards without synthetic fertilisers.						
3-4	2.1 Explain land preparation for organic pasture 2.2 Describe the application of soil testing for pH, OM, N, P, K, Ca, Mg. 2.3 Explain permitted amendments. 2.4 Describe seed rate (kg/ha) and planting depth.	• Explain land preparation for organic pasture • Discuss the application of soil testing for pH, OM, N, P, K, Ca, Mg. • Explain permitted amendments. • Discuss seed rate (kg/ha) and planting depth.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct a soil test on a chosen pasture plot. • Inoculate legume seed with Rhizobium. • Establish a 100 m² grass-legume mixed-sward plot. • Calculate the appropriate seed rate for a 1-ha mixed organic pasture. • Maintain weed control on an organic plot without synthetic herbicides. • Select grass-legume mixtures appropriate to agro-ecological zone • Apply broadcasting, drilling or under-sowing techniques. • Manage establishment: weed control by mowing, mechanical or hand-weeding (no synthetic herbicides).	Guide students to; • Conduct a soil test on a chosen pasture plot. • Inoculate legume seed with Rhizobium. • Establish a 100 m² grass-legume mixed-sward plot. • Calculate the appropriate seed rate for a 1-ha mixed organic pasture. • Maintain weed control on an organic plot without synthetic herbicides. • Select grass-legume mixtures appropriate to agro-ecological zone • Apply broadcasting, drilling or under-sowing techniques. • Manage establishment: weed control by mowing, mechanical or hand-weeding (no synthetic	Soil test kit. Rhizobium, seed. Plot, seeds, tools. Calculator. Hand tools.

				• Identify allowed organic weed-control products: vinegar (acetic acid), corn gluten meal, biological control. • Monitor establishment success (% groundcover, density). • Identify the role of legumes in biological nitrogen fixation (50–300 kg N/ha/yr).	herbicides). • Identify allowed organic weed-control products: vinegar (acetic acid), corn gluten meal, biological control. • Monitor establishment success (% groundcover, density). • Identify the role of legumes in biological nitrogen fixation (50–300 kg N/ha/yr).	
GENERAL OBJECTIVE 3.0: Understand rotational, mob and adaptive multi-paddock (AMP) grazing systems.						
5-6	3.1 Distinguish continuous from rotational grazing. 3.2 Outline rotational grazing principle 3.3 Explain mob grazing (high stock density, short duration). 3.4 Explain electric-fence (portable, solar-powered) as low-cost paddock divider. 3.5 Explain the benefits of improved pasture productivity, parasite-load	• Distinguish continuous from rotational grazing. • Discuss rotational grazing principle: paddocks, rest period, grazing period. • Explain mob grazing (high stock density, short duration). • Explain electric-fence (portable, solar-powered) as low-cost paddock divider. • Explain the benefits of improved pasture	Textbook Projector Whiteboard Marker Journal Computer Internet	• Design a rotational grazing plan for a 50-cow organic dairy herd. • Calculate paddock size, biomass and rest period for a chosen scenario. • Set up a temporary electric fence using portable posts and solar charger. • Measure grass height pre/post grazing on an institution plot. • Apply Adaptive Multi-Paddock (AMP) grazing using stock density 50,000–80,000 kg LW/ha for very short periods.	• Design a rotational grazing plan for a 50-cow organic dairy herd. • Calculate paddock size, biomass and rest period for a chosen scenario. • Set up a temporary electric fence using portable posts and solar charger. • Measure grass height pre/post grazing on an institution plot. • Apply Adaptive Multi-Paddock (AMP) grazing using stock density 50,000–80,000 kg LW/ha for very short periods.	Plan template. Calculator. Electric-fence kit. Biomass quadrant NIR Ruler, pasture. Farm access.

	reduction animal welfare, manure distribution.	productivity, parasite-load reduction animal welfare, manure distribution.		• Apply triangle/rectangle/wedge paddock design with central water source. • Apply laboratory techniques for quality assay • Examine Nigerian commercial farms using rotational grazing • Monitor grass height pre- and post-grazing (residual stubble height). • Visit a Nigerian rotational-grazing farm.	Guide students to; • Apply triangle/rectangle/wedge paddock design with central water source. • Apply laboratory techniques for quality assay • Examine Nigerian commercial farms using rotational grazing • Monitor grass height pre- and post-grazing (residual stubble height). • Visit a Nigerian rotational-grazing farm	
GENERAL OBJECTIVE 4.0: Know the application of silvopasture and agro-forestry to organic livestock systems.						
7	4.1 Define silvopasture as intentional integration of trees, forage and livestock. 4.2 Explain the benefits of shade, browse, fodder, carbon sequestration, soil improvement, microclimate. 4.3 Describe Nigerian fodder trees 4.4 Outline integration of silvopasture with	• Explain silvopasture as intentional integration of trees, forage and livestock. • Explain the benefits of shade, browse, fodder, carbon sequestration, soil improvement, microclimate. • Discuss Nigerian fodder trees • Outline integration	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify 10 Nigerian fodder trees in the field or from samples. • Plant 5 fodder-tree seedlings on the institution pasture. • Carryout pruning and cut-and-carry forage harvesting. • Compose a silvopasture design for a 5-ha organic cattle operation. • Examine tree-density and spacing patterns • Apply pruning, lopping	Guide students to; • Identify 10 Nigerian fodder trees in the field or from samples. • Plant 5 fodder-tree seedlings on the institution pasture. • Carryout pruning and cut-and-carry forage harvesting. • Compose a silvopasture design for a 5-ha organic cattle operation. • Examine tree-density and spacing patterns:	Tree samples. Seedlings, tools. Pruning equipment. Design template. Research access.

	cattle, sheep, goats, poultry, bees. 4.5 Explain climate-smart benefits. 4.6 Outline establishment costs and long-term returns.	of silvopasture with cattle, sheep, goats, poultry, bees. • Discuss climate-smart benefits. • Discuss establishment costs and long-term returns.		and cut-and-carry forage harvesting. • Identify Faidherbia albida's reverse phenology (sheds leaves in wet season). • Examine successful Nigerian silvopasture cases.	• Apply pruning, lopping and cut-and-carry forage harvesting. • Identify Faidherbia albida's reverse phenology (sheds leaves in wet season). • Examine successful Nigerian silvopasture cases.	
GENERAL OBJECTIVE 5.0: Know pasture quality, biomass and carrying capacity.						
8	5.1 Explain visual pasture-quality assessment 5.2 Explain carrying capacity. 5.3 Explain seasonal variation in biomass (wet and dry season).	• Explain visual pasture-quality assessment: leaf • Discuss carrying capacity: stocking rate that pasture can support sustainably. • Explain seasonal variation in biomass (wet and dry season).	Textbook Projector Whiteboard Marker Journal Computer Internet	• Measure biomass using clip-and-weigh, rising plate meter, sward stick • Determine DM content by oven drying. • Calculate carrying capacity for a chosen pasture and herd. • Convert a mixed herd into TLU. • Examine an NDVI image (or simulation) of pasture status. • Compute Animal Unit Months (AUM) for budgeting forage. • Apply remote-sensing technology (NDVI from satellite/drone) for large-scale assessment. • Maintain pasture-	Guide students to; • Measure biomass using clip-and-weigh, rising plate meter, sward stick • Determine DM content by oven drying. • Calculate carrying capacity for a chosen pasture and herd. • Convert a mixed herd into TLU. • Examine an NDVI image (or simulation) of pasture status. • Compute Animal Unit Months (AUM) for budgeting forage. • Apply remote-sensing technology (NDVI from satellite/drone) for large-scale assessment.	Quadrat, scissors, balance. Oven. Calculator. TLU conversion table. NDVI image.

				monitoring records for certification.	• Maintain pasture-monitoring records for certification.	
GENERAL OBJECTIVE 6.0: Know forage, hay, haylage, silage and standing-hay systems under organic standards.						
9-10	6.1 Explain the strategic importance of forage conservation for dry-season feeding in Nigeria. 6.2 Explain haymaking risks 6.3 Explain silage additives permitted under organic standards 6.4 Differentiate bunker, pit, baled and tube silage systems.	• Explain the strategic importance of forage conservation for dry-season feeding in Nigeria. • Explain haymaking risks: rain damage and mould • Explain silage additives permitted under organic standards (whey, molasses, lactic acid bacteria). • Distinguish bunker, pit, baled and tube silage systems.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Make a small batch of hay; • Assess moisture and quality. • Make a small silage trial in a plastic bag/drum. • Assess silage quality after 21 days using pH and smell. • Compose a dry-season feeding plan integrating hay, silage and standing hay. • Investigate Nigerian commercial silage operations. • Assess silage quality: pH (3.8–4.2), smell (sweet/lactic), no mould. • Apply standing-hay (deferred grazing): allow pasture to mature and stand for dry-season grazing. • Conserve crop residues organically: maize stover, sorghum stover, rice	• Make a small batch of hay; • Assess moisture and quality. • Make a small silage trial in a plastic bag/drum. • Assess silage quality after 21 days using pH and smell. • Compose a dry-season feeding plan integrating hay, silage and standing hay. • Investigate Nigerian commercial silage operations. • Assess silage quality: pH (3.8–4.2), smell (sweet/lactic), no mould. • Apply standing-hay (deferred grazing): allow pasture to mature and stand for dry-season grazing. • Conserve crop residues organically: maize stover, sorghum stover, rice	Forage, baling materials. Drum, plastic, chopper. pH meter. Plan template. Research access.

				straw, groundnut haulms, cowpea haulms. • Apply urea treatment of stover with caution under organic standards (urea is sometimes permitted; verify). • Identify economic benefits: dry-season feeding, milk production maintenance, fattening.	straw, groundnut haulms, cowpea haulms. • Apply urea treatment of stover with caution under organic standards (urea is sometimes permitted; verify). • Identify economic benefits: dry-season feeding, milk production maintenance, fattening.	
GENERAL OBJECTIVE 7.0: Know range degradation, encroachment and invasive species.						
11	7.1 Define rangeland degradation and indicators 7.2 Explain drivers 7.3 Explain common Nigerian invasive species 7.4 Explain the role of agroforestry in rangeland rehabilitation. 7.5 Describe the Nigerian livestock growth acceleration strategy (NL-GAS 2025-2035) and rangeland reserves.	• Discuss rangeland degradation and indicators: bare soil, erosion, weed invasion, reduced productivity. • Discuss drivers: overgrazing, climate change, fire mismanagement, encroachment, deforestation. • Explain common Nigerian invasive species: Imperata cylindrica (spear grass), Chromolaena odorata (Siam weed), Sida acuta,	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify degradation indicators on a chosen field plot. • Identify 5 invasive plant species in the local environment. • Apply manual control on a small invasive-plant patch. • Compose a rehabilitation plan for a degraded pasture. • Examine controlled (cool) burning as a management tool (with caution under organic standards). • Apply soil and water conservation: contour bunds, vegetative strips,	Guide students to; • Identify degradation indicators on a chosen field plot. • Identify 5 invasive plant species in the local environment. • Apply manual control on a small invasive-plant patch. • Compose a rehabilitation plan for a degraded pasture. • Examine controlled (cool) burning as a management tool (with caution under organic standards). • Apply soil and water conservation: contour bunds, vegetative strips,	Field access. Plant samples. Hand tools. Plan template. NL-GAS extract.

		Tithonia diversifolia. • Explain the role of agroforestry in rangeland rehabilitation. • Discuss the Nigerian livestock growth acceleration NL-GAS and rangeland reserves.		swales, terracing. • Implement rangeland reseeding with native species. • Examine community-based rangeland management among pastoralists.	swales, terracing. • Implement rangeland reseeding with native species. • Examine community-based rangeland management among pastoralists.	
GENERAL OBJECTIVE 8.0: Know carbon sequestration and climate benefits of organic pastures.						
12	8.1 Outline the global carbon cycle and the role of pastures as carbon sinks. 8.2 Explain soil organic carbon (SOC) as the largest terrestrial carbon pool. 8.3 Distinguish CO_2, CH_4 (enteric, manure) and N_2O (fertiliser, manure) emissions. 8.4 Explain carbon-credit and Payment for Ecosystem Services (PES) opportunities for	• Discuss the global carbon cycle and the role of pastures as carbon sinks. • Discuss soil organic carbon (SOC) as the largest terrestrial carbon pool. • Distinguish CO_2, CH_4 (enteric, manure) and N_2O (fertiliser, manure) emissions. • Discuss carbon-credit and Payment for Ecosystem Services (PES) opportunities for organic ranchers. • Discuss Nigerian	Textbook Projector Whiteboard Marker Journal Computer Internet	• Carry out practices enhancing SOC: rotational grazing, perennial grasses, legumes, no synthetic fertiliser, manure recycling, agroforestry. • Calculate the carbon footprint of organic herd. • Compose a climate-smart pasture-management plan. • Examine Nigerian NDC livestock commitments. • Apply mitigation: diet (high-quality forage reduces CH_4), manure management, reduced stocking on degraded land.	Guide students to: • Examine practices enhancing SOC: rotational grazing, perennial grasses, legumes, no synthetic fertiliser, manure recycling, agroforestry. • Calculate the carbon footprint of organic herd. • Compose a climate-smart pasture-management plan. • Examine Nigerian NDC livestock commitments. • Apply mitigation • Examine net climate balance for organic livestock systems. • Apply climate-smart	SOC calculator. Footprint tool. Plan template. NDC document.

	organic livestock farmers. 8.5 Explain Nigerian climate commitments (NDC) and livestock sector role.	climate commitments (NDC) and livestock sector role.		• Examine net climate balance for organic livestock systems. • Apply climate-smart livestock principles.	livestock principles.	
GENERAL OBJECTIVE 9.0: Know the application of pasture-based parasite control						
13-14	9.1 Explain pasture-based parasite management 9.2 Explain rotational grazing to break parasite life cycles. 9.3 Explain multi-species grazing for cross-species parasite reduction.	• Explain pasture-based parasite management • Explain rotational grazing to break parasite life cycles. • Explain multi-species grazing for cross-species parasite reduction.	NLTP document. Textbook Projector Whiteboard Marker Journal Computer Internet	• Compose a capstone pasture-management plan for a chosen scenario. • Apply rotational grazing to break parasite life cycles. • Apply multi-species grazing for cross-species parasite reduction.	Guide students to; • Compose a capstone pasture-management plan for a chosen scenario. • Apply rotational grazing to break parasite life cycles. • Apply multi-species grazing for cross-species parasite reduction.	Plan rubric. Research access. Submission. Assessment.
General Objective 10: Understand Peace building in Nigerian pastoralist contexts.						
15	10.1 Explain Nigerian pastoralist context 10.2 Describe Nigerian National Livestock Transformation Plan (NL-GAS) and ranch development. 10.3 Outline grazing reserves and stock	• Explain Nigerian pastoralist context • Discuss Nigerian National Livestock Transformation Plan (NL-GAS) and ranch development. • Outline grazing reserves and stock routes (burti). • Discuss conflict-	NL-GAS document. Textbook Projector Whiteboard Marker Journal Computer Internet .	• Investigate Nigerian farmer-herder conflict and propose mitigation. • Develop ranches as a sustainable alternative.	Guide students to: • Investigate Nigerian farmer-herder conflict and propose mitigation. • Develop ranches as a sustainable alternative.	Submission. Assessment

	routes (burti). 10.4 Describe conflict-mitigation measures: dialogue, dispute resolution, GIS mapping, land tenure clarity, peace committees.	mitigation measures: dialogue, dispute resolution, GIS mapping, land tenure clarity, peace committees.				

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

ORGANIC POULTRY PRODUCTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC POULTRY PRODUCTION	**COURSE CODE: OAP 413**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE: OAP 315, OAP 317**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills to manage organic poultry production		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Comprehend NOAN, EU 2018/848 and USDA NOP organic poultry standards; 2.0 Know indigenous breeds suitable for organic systems; 3.0 Know pasture-based, mobile and fixed housing systems for organic poultry; 4.0 Formulate organic poultry diets without synthetic amino acids and growth promoters; 5.0 Know organic broiler production from day-old to market; 6.0 Know organic egg production with welfare and certification compliance; 7.0 Know preventive health and biosecurity in organic poultry flocks; 8.0 Know Processing, storage and marketing of organic poultry products in Nigeria; 9.0 Know integrated management to minor poultry (turkey, guinea fowl, ducks, quail).		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION		
COURSE TITLE: ORGANIC POULTRY PRODUCTION	COURSE CODE: OAP 413	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills to manage organic poultry production		
GENERAL OBJECTIVE 1.0: Comprehend NOAN, EU 2018/848 and USDA NOP organic poultry standards.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 State the four IFOAM principles applied to poultry: Health, Ecology, Fairness, Care. 1.2 Outline NOAN standards for Nigerian organic poultry. 1.3 Explain EU 2018/848 poultry requirements 1.4 Outline USDA NOP poultry rules including 100 % organic feed, outdoor access, no GMO, no antibiotics post-day-2. 1.5 Differentiate certified organic from free-range	• Discuss the four IFOAM principles applied to poultry: Health, Ecology, Fairness, Care. • Outline NOAN standards for Nigerian organic poultry. • Discuss EU 2018/848 poultry requirements: minimum 4 m²/bird outdoor (layers); 81 d minimum slaughter age (broilers, slower-growing strains); flock-size limits (3,000 layers, 4,800 broilers per house).	Standards documents NOAN materials. Projector. Textbook Projector Whiteboard Marker Journal Computer Internet	• Compose a comparative table of NOAN, EU, USDA NOP and IFOAM rules for poultry. • Visit an organic poultry farm in Nigeria. • Identify the certification body relevant to a chosen Nigerian context.	Guide students to: • Compose a comparative table of NOAN, EU, USDA NOP and IFOAM rules for poultry. • Visit (or virtually tour) an organic poultry farm in Nigeria. • Identify the certification body relevant to a chosen Nigerian context.	Comparison template. Farm access. Certifier directory. Case studies.

	and pasture-raised. 1.6 Explain prohibited practices: beak trimming (largely), forced moulting, growth promoters, prophylactic antibiotics, GMO feed. 1.7 Explain allowed practices: vaccinations, nutritional supplements, herbal treatments, beak trimming as last-resort under EU. 1.8 Explain certification and audit requirements. 1.9 Explain Nigerian organic poultry market opportunity.	• Discuss USDA NOP poultry rules including 100 % organic feed, outdoor access, no GMO, no antibiotics post-day-2. • Distinguish certified organic from free-range and pasture-raised. • Discuss prohibited practices: beak trimming (largely), forced moulting, growth promoters, prophylactic antibiotics, GMO feed. • Recognise allowed practices: vaccinations, nutritional supplements, herbal treatments, beak trimming as last resort under EU. • Explain certification and audit requirements. • Discuss Nigerian organic poultry market opportunity.				
GENERAL OBJECTIVE 2.0: Know indigenous breeds suitable for organic systems.						
3	2.1 Explain the importance of slower-growing breeds in organic systems 2.2 Describe Nigerian	• Discuss the importance of slower-growing breeds in organic systems (higher	Textbook Projector Whiteboard Marker Journal	• Identify 6 Nigerian indigenous chicken ecotypes by photograph and live specimens.	Guide students to: • Identify 6 Nigerian indigenous chicken ecotypes by photograph and live specimens.	Breed photos, birds. Calculator. Plan

	indigenous chicken ecotypes 2.3 Distinguish between dual-purpose and specialized dual purpose 2.4 Describe broiler breeds 2.5 Outline production parameters for indigenous strains 2.6 State parameters for Sasso/slow broilers 2.7 Explain the welfare advantages of slow-growing breeds (lower mortality, less lameness, better leg health etc).	welfare, hardier, suit pasture). • Discuss Nigerian indigenous chicken ecotypes: Frizzle, Naked Neck (Nudi-neck), normal feathered, Yoruba indigenous, Fulani native, Sasso. • Distinguish between dual-purpose and specialized dual purpose • Dual-purpose (Rhode Island Red, Sussex, Plymouth Rock); specialised (Cornish-Cross for broilers — generally not organic-suited; Lohmann Brown for layers). • Explain slower-growing broiler breeds: Sasso, Hubbard JA57, Ross Ranger,	Computer Internet	• Calculate egg production and meat yield for an indigenous flock, Sasso and Cobb scenario. • Compose a crossbreeding plan for upgrading a local flock. • Investigate NACGRAB or NAPRI native-chicken conservation programme. • Identify hybrid layers acceptable in organic systems: Lohmann Brown, Bovans Brown, ISA Brown (with reservations on origin). • Trace genetic-conservation programmes for Nigerian native chickens (NAPRI). • Examine crossbreeding for organic improvement (indigenous and exotic).	• Calculate egg production and meat yield for an indigenous flock, Sasso, Cobb scenarios. • Compose a crossbreeding plan for upgrading a local flock. • Investigate NACGRAB or NAPRI native-chicken conservation programme. • Identify hybrid layers acceptable in organic systems: Lohmann Brown, Bovans Brown, ISA Brown (with reservations on origin). • Trace genetic-conservation programmes for Nigerian native chickens (NAPRI). • Examine crossbreeding for organic improvement (indigenous and exotic).	template. NACGRAB materials.

		Cobb 700-SF (suit organic standards). • Discuss production parameters for indigenous strains: 60–80 eggs/yr; 1.0–1.5 kg slaughter weight at 5–6 mo. • Explain parameters for Sasso/slow broilers: 81 d minimum to 2.0–2.5 kg; better welfare. • Discuss the welfare advantages of slow-growing breeds (lower mortality, less lameness, better leg health).				
GENERAL OBJECTIVE 3.0: Know pasture-based, mobile and fixed housing systems for organic poultry.						
4-5	3.1 Describe organic housing requirements: minimum indoor floor space. 3.2 Explain locally	• Discuss organic housing requirements: minimum indoor floor space. • Explain locally available, low-cost	Textbook Projector Whiteboard Marker Journal	• Construct a small mobile chicken tractor for 25 birds. • Calculate space requirements for a	Guide students to: • Construct a small mobile chicken tractor for 25 birds. • Calculate space	Construction materials. Calculator. Housing access.

	available, low-cost building materials. 3.3 Explain waste management.	building materials: wood, bamboo, mud bricks, palm thatch, used containers. • Discuss waste management: deep litter (later compost), free-range manure distribution.	Computer Internet	500-layer organic operation. • Inspect the institution poultry housing • Identify deviations from organic standards. • Design a fixed organic broiler house plan to scale. • Compose a housing-construction budget. • Apply natural lighting (minimum 1/20 floor area as window). • Provide perches, nest boxes, dust-bathing area, scratch substrate. • Apply ventilation (cross or ridge) and temperature management. • Construct predator-proof fencing (electric, woven wire). • Calculate stocking density and adjust for indigenous vs exotic strains.	requirements for a 500-layer organic operation. • Inspect the institution poultry housing; identify deviations from organic standards. • Design a fixed organic broiler house plan to scale. • Compose a housing-construction budget. • Apply natural lighting (minimum 1/20 floor area as window). • Provide perches, nest boxes, dust-bathing area, scratch substrate. • Apply ventilation (cross or ridge) and temperature management. • Construct predator-proof fencing (electric, woven wire) • Calculate stocking density and adjust for indigenous vs exotic strains.	Plan paper. Budget template.
GENERAL OBJECTIVE 4.0: Formulate organic poultry diets without synthetic amino acids and growth promoters.						
6-7	4.1 Explain organic feed ingredient requirements	• Explain organic feed ingredient requirements:	Whiteboard, NRC/NIAS	• Formulate an organic broiler starter, grower	Guide students to: • Formulate an organic	Feed ingredients.

	4.2 Explain organic-permitted protein sources 4.3 Explain approved minerals. 4.4 Explain approved vitamins from natural sources.	100 % certified organic (USDA NOP); 95 % organic + 5 % allowed non-organic protein (EU during transition). • Discuss organic-permitted protein sources: organic soybean meal, organic groundnut cake, organic fishmeal (with restrictions), insect protein, sunflower cake, peas, sesame. • Explain allowed minerals: limestone, oyster shell, salt, rock phosphate, kelp, seaweed. • Explain allowed vitamins from natural sources (carotenoids from lutein-rich plants).	tables, Reference textbooks. Projector.	and finisher diet by Pearson square. • Formulate an organic layer mash. • Calculate the methionine challenge in indigenous-strain organic diet. • Set up a small BSF larvae production trial for poultry feed. • Examine feed ingredients available in Nigerian organic markets. • Apply forage-based nutrition: free-range scavenging, legume pastures, fodder trees (Moringa, Leucaena, Gliricidia, Tithonia). • Provide insect protein from black-soldier-fly (BSF) larvae production on farm waste. • Use whole grains, fermented grains, sprouted grains for digestibility. • Apply Pearson square and computer based organic feed	broiler starter, grower and finisher diet by Pearson square. • Formulate an organic layer mash. • Calculate the methionine challenge in indigenous-strain organic diet. • Set up a small BSF larvae production trial for poultry feed. • Examine feed ingredients available in Nigerian organic markets. • Apply forage-based nutrition: free-range scavenging, legume pastures, fodder trees (Moringa, Leucaena, Gliricidia, Tithonia). • Provide insect protein from black-soldier-fly (BSF) larvae production on farm waste. • Use whole grains, fermented grains, sprouted grains for digestibility. • Apply Pearson square and computer based organic feed formulation.	NRC tables. Calculator. BSF substrate. Market access,feed formulation softwares.

				formulation.		
GENERAL OBJECTIVE 5.0: Know organic broiler production from day-old to market.						
8-9	5.1 Explain sourcing challenges in Nigeria. 5.2 Describe ante-mortem inspection prior to slaughter. 5.3 Explain slaughter, processing and chilling. 5.4 State a complete cycle plan from chick to market for 500 organic broilers.	• Explain sourcing challenges in Nigeria. • Discuss ante-mortem inspection prior to slaughter. • Explain slaughter, processing and chilling. • State a complete cycle plan from chick to market for 500 organic broilers.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Brood a small batch of day-old chicks under organic-compliant conditions. • Conduct vaccination on broilers following the schedule. • Conduct weekly weighing and FCR calculation. • Inspect a flock for welfare and health indicators. • Submit a complete cycle plan for 500 organic broilers. • Manage pasture rotation: 2–4 weeks rest between groups • Plan slaughter, processing and chilling.	Guide students to: • Brood a small batch of day-old chicks under organic-compliant conditions. • Conduct vaccination on broilers following the schedule. • Conduct weekly weighing and FCR calculation. • Inspect a flock for welfare and health indicators. • Submit a complete cycle plan for 500 organic broilers. • Manage pasture rotation: 2–4 weeks rest between groups • Plan slaughter, processing and chilling.	Chicks, brooder. Vaccines. Scale, calculator. Inspection checklist. Plan template.
GENERAL OBJECTIVE 6.0: Know organic egg production with welfare and certification compliance.						
10-11	6.1 Explain the management of natural light cycles 6.2 Explain production parameters in well-managed organic	• Explain the management of natural light cycles; supplement to maximum 16 h light (EU rule). • Discuss production	Textbook Projector Whiteboard Marker Journal	• Source organic pullets (16–18 weeks old) from certified rearing facilities. • Manage a small	Guide students to: • Source organic pullets (16–18 weeks old) from certified rearing facilities.	Layer flock. Egg quality equipment. SOP template.

	hybrids. 6.3 Explain steps in collecting and storing eggs.	parameters in well-managed organic hybrids. • Explain steps in collecting and storing eggs.	Computer Internet	organic layer flock for one month. • Measure egg-quality parameters: weight, shell thickness, Haugh unit. • Compose an egg-collection and packaging SOP. • Calculate the cost per dozen for an organic layer enterprise. • Design a label that complies with organic certification requirements.	• Manage a small organic layer flock for one month. • Measure egg-quality parameters: weight, shell thickness, Haugh unit. • Compose an egg-collection and packaging SOP. • Calculate the cost per dozen for an organic layer enterprise. • Design a label that complies with organic certification requirements.	Calculator. Design tools.
GENERAL OBJECTIVE 7.0: Know preventive health and bio-security in organic poultry flocks.						
12	7.1 Explain organic bio-security. 7.2 Explain common parasites 7.3 Describe organic parasite control 7.4 List major diseases 7.5 Explain heat-stress management in tropical conditions 7.6 Outline predator-control 7.7 Identify allowed botanicals for poultry	• Explain organic bio-security. • Identify common parasites: coccidia (Eimeria spp.), Ascaridia galli, Heterakis gallinarum, lice, mites, scaly leg mite. • Discuss organic parasite control • List major diseases: Newcastle (notifiable, vaccinate), Gumboro,	Textbook Projector Whiteboard Marker Journal Computer Internet	• Vaccinate a batch of broilers against common infectious diseases. • Identify common poultry parasites on faecal flotation and post-mortem. • Conduct a welfare audit on the institution flock. • Prepare a herbal poultry tonic (neem, black pepper, canyen	Guide students to: • Vaccinate a batch of broilers against Newcastle. • Identify common poultry parasites on faecal flotation and post-mortem. • Conduct a welfare audit on the institution flock. • Prepare a herbal poultry tonic (neem, garlic, turmeric). • Compose a Newcastle	Vaccines. Faecal samples, microscope. Welfare checklist. Herbal ingredients. Plan template.

	health. 7.8 Explain green infrastructural development for a poultry farm.	infectious bronchitis, Marek's, fowl cholera, salmonellosis, colibacillosis. • Explain heat-stress management in tropical conditions: shade, water, fan-free passive ventilation. • Outline predator-control: dogs, fencing, secure housing. • Identify allowed botanicals for poultry health: turmeric, garlic, ginger, neem, oregano. • Explain green infrastructural development for a poultry farm		pepper, garlic, turmeric). • Compose common infectious diseases prevention plan for an organic layer farm. • Maintain post-mortem and clinical-history records. • Compose green infrastructural development plan for a poultry farm	disease prevention plan for an organic layer farm. • Maintain post-mortem and clinical-history records.	
GENERAL OBJECTIVE 8.0: Know processing, storage and marketing organic poultry products in Nigeria.						
13-14	8.1 Describe organic-compliant slaughter 8.2 Explain Packaging for organic premium market with certification logo, traceability info, etc. 8.3 Describe Nigerian premium markets 8.4 Explain FAOSTAT/USDA-AMS price data.	• Explain organic-compliant slaughter: stress-free handling, stunning where permitted, hygienic slaughter. • Discussing Packaging for organic premium market with certification logo, traceability info, etc.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct slaughter and processing of a chicken under supervision • Grade 20 eggs by weight and candling. • Design an organic poultry label with all required information. • Visit a Nigerian premium retail outlet; • Document organic	Guide student to: • Conduct slaughter and processing of a chicken (under supervision, follow halal where applicable). • Grade 20 eggs by weight and candling. • Design an organic poultry label with all required information.	Chicken, slaughter tools. Eggs, scale. Design tools. Retail access. Plan template.

	8.5 Explain regulatory compliance.	• Identify Nigerian premium markets: supermarkets (SPAR, ShopRite, Hubmart), urban consumers, expatriate communities, organic outlets, online platforms. • Identify FAOSTAT/USDA-AMS price data. • Outline regulatory compliance: NAFDAC food, SON, NESREA waste; halal certification for Muslim markets.		poultry pricing. • Compose a marketing plan for a 500-bird organic poultry enterprise. • Apply pricing premiums (50–150 % above conventional for certified organic). • Apply traceability: batch tracking, online QR code, farm visit days	• Visit a Nigerian premium retail outlet; • Document organic poultry pricing. • Compose a marketing plan for a 500-bird organic poultry enterprise. • Apply pricing premiums (50–150 % above conventional for certified organic). • Apply traceability: batch tracking, online QR code, farm visit days	
GENERAL OBJECTIVE 9.0: Know integrated management of other avian species, turkey, guinea fowl, ducks, quail.						
15	9.1 Describe organic turkey production 9.2 Describe organic duck production 9.3 Describe organic quail production with welfare and certification considerations. 9.4 Explain the contribution of minor poultry to Nigerian rural livelihoods.	• Discuss organic turkey production: Bronze, Black, Norfolk Black, Beltsville (slower growing for organic). • Discuss organic duck production: Muscovy (Anas moschata), Pekin, Aylesbury for meat; Khaki Campbell, Indian Runner for eggs. • Discuss organic quail production with welfare and certification	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify Nigerian indigenous guinea fowl (Tonton). • Apply organic guinea fowl (Numida meleagris) production using indigenous Nigerian Tonton breed. • Examine pigeon and Japanese quail for niche markets.	Guide students to: • Identify Nigerian indigenous guinea fowl (Tonton). • Apply organic guinea fowl (Numida meleagris) production using indigenous Nigerian Tonton breed. • Examine pigeon and Japanese quail for niche markets	Guinea fowl access. Plan rubric. Submission. Assessment.

		considerations. • Discuss the contribution of minor poultry to Nigerian rural livelihoods.				

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

ORGANIC SWINE PRODUCTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC SWINE PRODUCTION	**COURSE CODE: OAP 414**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: I	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in organic production of swine		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Know organic swine standards; 2.0 Know breeds suitable for intensive and extensive organic production of swine; 3.0 Design outdoor and deep-bedded indoor housing for organic production of pigs; 4.0 Know organic swine diets without synthetic supplements; 5.0 Know farrowing, weaning and piglet handling under organic welfare rules; 6.0 Know growing-finishing pigs to market under organic standards; 7.0 Know preventive health and bio-security; 8.0 Understand Nigerian premium-pork value chain.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION		
COURSE TITLE: ORGANIC SWINE PRODUCTION	COURSE CODE: OAP 414	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in organic production of swine		
GENERAL OBJECTIVE 1.0: Know organic swine standards.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Explain the IFOAM Principle of Care applied to swine 1.2 List EU 2018/848 swine requirements 1.3 Outline USDA NOP rules: 100 % organic feed; outdoor access; no routine antibiotics; no synthetic parasiticides. 1.4 Describe NOAN provisions for Nigerian organic swine. 1.5 Distinguish between certified organic, free-	• State the IFOAM Principle of Care applied to swine: respect natural behaviour (rooting, wallowing, social grouping, nesting). • Outline EU 2018/848 swine requirements: outdoor access (minimum 0.6 m² outdoor for finishers); group housing for gestating sows; straw bedding; no tail docking (only as last-resort).	Textbook Projector Whiteboard Marker Journal Computer Internet	• Compile a comparative table of organic swine standards. • Visit a Nigerian piggery; • Identify deviations from organic standards. • Examine the Nigerian organic swine context: non-Muslim markets, ASF risk, ethical-consumer demand.. • Profile the Nigerian premium-pork market sources.	Guide students to: • Compile a comparative table of organic swine standards. • Visit a Nigerian piggery; • Identify deviations from organic standards. • Examine the Nigerian organic swine context: non-Muslim markets, ASF risk, ethical-consumer demand.. • Profile the Nigerian premium-pork market sources.	Comparison template. Piggery access. Discussion materials. Market data.

	range and pastured pork.	• Outline USDA NOP rules: 100 % organic feed; outdoor access; no routine antibiotics; no synthetic parasiticides. • Discuss NOAN provisions for Nigerian organic swine. • Distinguish between certified organic free-range and pastured pork.				
GENERAL OBJECTIVE 2.0: Know breeds suitable for intensive and extensive organic production of swine						
3	2.1 Explain Nigerian native pig (Nigerian indigenous) characteristics 2.2 Describe heritage breeds suited to organic outdoor 2.3 Distinguish between intensive commercial breeds and extensive commercial breeds 2.4 Explain commercial slower-growing crossbreeds suitable for organic. 2.5 Outline performance: native vs heritage vs	• Discuss Nigerian native pig (Nigerian indigenous) characteristics: hardy, smaller, slower-growing, less prolific (5–8 piglets/litter) but suited to outdoor. • Discuss heritage breeds suited to organic outdoor: Large Black, Tamworth, Gloucester Old Spots, Berkshire, Saddleback. • Explain the differences between	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify native and exotic breeds of pig from photos/live animals. • Calculate breed-performance comparison for organic systems. • Compose a cross-breeding plan for upgrading a Nigerian native pig herd. • Investigate NAPRI native-pig conservation programmes. • Trace genetic-	Guide students to: • Identify native and exotic breeds of pig from photos/live animals. • Calculate breed-performance comparison for organic systems. • Compose a cross-breeding plan for upgrading a Nigerian native pig herd. • Investigate NAPRI native-pig conservation programmes. • Trace genetic-conservation efforts for Nigerian indigenous pigs	Breed photos, pigs. Calculator. Plan template. NAPRI materials.

	commercial 2.6 Describe tropical adaptation	intensive commercial breeds and extensive commercial breeds • Elucidate commercial slower-growing crossbreeds suitable for organic. • Outline performance: native vs heritage vs commercial: litter size, mortality, growth rate (target 600 g/day ADG for organic), feed conversion, slaughter weight (90–110 kg). • Discuss tropical adaptation: heat tolerance, parasite resistance, foraging ability.		conservation efforts for Nigerian indigenous pigs (NAPRI). • Apply crossbreeding for hardiness and productivity. • Examine welfare advantages of slower-growing heritage breeds.	(NAPRI). • Apply crossbreeding for hardiness and productivity. • Examine welfare advantages of slower-growing heritage breeds.	
GENERAL OBJECTIVE 3.0: Know outdoor and deep-bedded indoor housing for organic production of pigs.						
4	3.1 Describe outdoor housing 3.2 Explain social grouping 3.3 Describe locally available materials 3.4 Outline waste management	• Discuss outdoor housing: paddocks with arc/hut shelters, electric fencing, wallow pit, shade. • Explain social grouping: sows in groups of 4–10; not isolated (except farrowing).	Textbook Projector Whiteboard Marker Journal Computer Internet	• Construct a small pig arc/hut. • Calculate paddock numbers for a 50-sow organic outdoor unit. • Inspect the institution piggery; • Identify deviations from organic. • Design a farrowing arc	Guide students to: • Construct a small pig arc/hut. • Calculate paddock numbers for a 50-sow organic outdoor unit. • Inspect the institution piggery • Identify deviations from organic.	Construction materials. Calculator. Piggery access. Plan paper. Budget template.

		• Discuss locally available materials: wood, palm fronds, used containers, recycled metal. • Outline waste management: deep-bed composting; rotational paddock manure dispersal.		plan. • Design deep-bedded indoor housing • Compose a housing-construction budget. • Apply bio-security at paddock entries.	• Design a farrowing arc plan. • Design deep-bedded indoor housing: straw or rice husks 30–40 cm deep • Replace seasonally. • Compose a housing-construction budget • Apply bio-security at paddock entries.	
GENERAL OBJECTIVE 4.0: Formulate organic swine diets without synthetic supplements.						
5-6	4.1 List organic feed-ingredient sources for pigs 4.2 List allowed minerals from natural sources 4.3 List herbal feed additives 4.4 List probiotics and prebiotics for organic pig rations	• Enumerate organic feed-ingredient sources for pigs: organic maize, organic sorghum, organic millet, soybean meal, groundnut cake, palm-kernel cake (with limits), brewers' dried grains. • Outline allowed minerals: limestone, salt, rock phosphate; vitamins from natural sources where possible. • Enumerate herbal feed additives: garlic, turmeric, oregano, neem.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Formulate organic creep, starter, grower, finisher, gestation and lactation diets. • Calculate FCR for an organic grower diet. • Examine 10 Nigerian organic-compatible feed ingredients. • Prepare a fermented-grain feed sample. • Maintain a feed-purchase record book.	• Guide students to: • Formulate organic creep, starter, grower, finisher, gestation and lactation diets. • Calculate FCR for an organic grower diet. • Examine 10 Nigerian organic-compatible feed ingredients. • Prepare a fermented-grain feed sample • Maintain a feed-purchase record book.	Ingredients. Calculator. Feed samples. Fermentation materials. Record book.

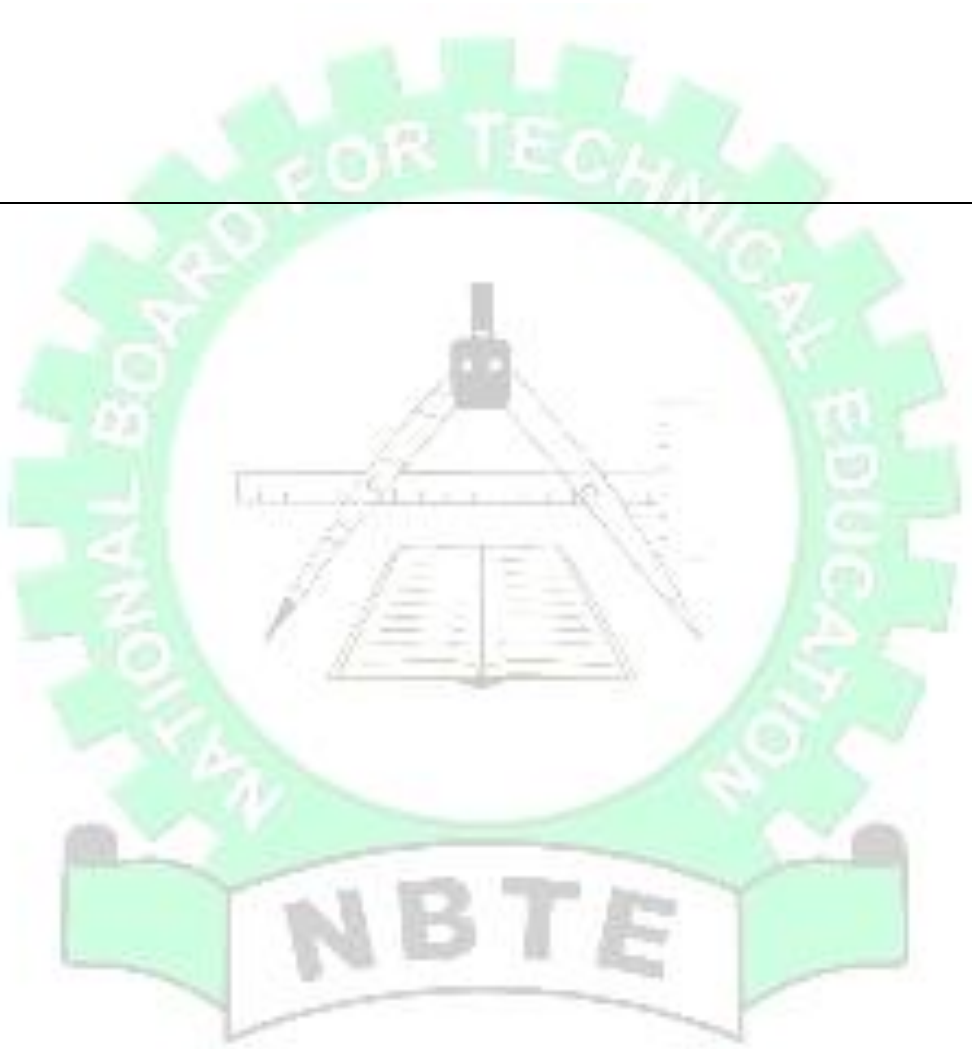
		• Outline probiotics and prebiotics for organic pig rations				
GENERAL OBJECTIVE 5.0: Know farrowing, weaning and piglet handling under organic welfare rules.						
7-8	5.1 Define gestation. 5.2 Explain the preparation of sow for farrowing. 5.3 Describe dystocia. 5.4 Explain farrowing and post-natal care of sow and piglet. 5.5 Define weaning.	• Explain gestation • Explain the preparation of sow for farrowing • Explain dystocia • Explain farrowing and post-natal care of sow and piglet • Explain weaning	Textbook Projector Whiteboard Marker Journal Computer Internet	• Observe a farrowing . • Care for a newborn piglet (drying, ensure colostrum). • Apply ear-tag identification on a piglet. • Administer iron supplements • Calculate piglets/sow/year for an organic system. • Compose a piglet welfare protocol following organic standards. • Manage post-weaning: gradual feed change, group socialisation, no antibiotic prophylaxis.	Guide students to: • Observe a farrowing. • Care for a newborn piglet (drying, ensure colostrum). • Apply ear-tag identification on a piglet. • Administer iron supplements • Calculate piglets/sow/year for an organic system. • Compose a piglet welfare protocol following organic standards. • Manage post-weaning: gradual feed change, group socialisation, no antibiotic prophylaxis.	Farrowing facility Newborn piglets. Ear tags. Calculator. Protocol template.
GENERAL OBJECTIVE 6.0: Know growing-finishing pigs to market under organic standards.						
9	6.1 Explain the management of growing pigs pasture access, group housing, organic grower diet. 6.2 Explain welfare	• Discuss the management of growing pigs pasture access, group housing, organic grower diet. • Explain welfare	Textbook Projector Whiteboard Marker Journal Computer	• Weigh growing-finishing pigs weekly for one month. • Calculate FCR for the institution pig unit. • Conduct a welfare	• Weigh growing-finishing pigs weekly for one month. • Calculate FCR for the institution pig unit. • Conduct a welfare audit	Scale, pigs. Calculator. Audit checklist. SOP template.

	assessments 6.3 Describe environmental enrichment 6.4 Explain Handling and restraints in organic pig farming	assessment: lameness, lesions, behaviour, social interactions. • Discuss environmental enrichment: rooting substrate, toys, social grouping.	Internet	audit on a pig unit. • Compose a transport SOP for organic pigs. • Maintain a growth record book.	on a pig unit. • Compose a transport SOP for organic pigs • Maintain a growth record book.	Record book.
GENERAL OBJECTIVE 7.0: Know preventive health and biosecurity						
10-11	7.1 Describe African Swine Fever (ASF) as Nigeria's most devastating swine disease (no commercial vaccine). 7.2 Distinguish African Swine Fever (ASF) from Classical Swine Fever (CSF); use PCR confirmation. 7.3 Describe other priority swine diseases 7.4 Describe internal and external parasites 7.5 Outline bio-security measures 7.6 Outline other common diseases	• Discuss African Swine Fever (ASF) as Nigeria's most devastating swine disease (no commercial vaccine). • Distinguish African Swine Fever (ASF)from Classical Swine Fever (CSF); use PCR confirmation. • Discuss other priority swine diseases: PRRS, swine influenza, swine erysipelas, swine brucellosis, mycoplasmosis. • Explain internal and external parasites • Discuss bio-security measures • Discuss other common diseases	Disease atlases. ASF emergency guidelines. Reference textbooks. Projector.	• Audit a piggery for ASF biosecurity. • Conduct a post-mortem on a dead pig (or specimen) • Identify gross lesions. • Prepare phyto medicines for prevention of viral diseases • Compose an ASF outbreak response plan. • Apply vaccinations • Manage internal parasites (Ascaris suum, Trichuris, coccidia) with organic methods. • Manage external parasites (sarcoptic mange, lice) with organic-compliant treatments. • Monitor herd health	Guide students to: • Audit a piggery for ASF biosecurity. • Conduct a post-mortem on a dead pig (or specimen) • Identify gross lesions. • Prepare a neem-and-garlic paste for parasite control. • Compose an ASF outbreak response plan. • Apply vaccinations where permitted: erysipelas, parvovirus, leptospirosis. • Manage internal parasites (Ascaris suum, Trichuris, coccidia) with organic methods. • Manage external parasites (sarcoptic mange, lice) with organic-compliant treatments. • Monitor herd health daily: appetite, activity, coat, faeces.	Audit checklist. Cadaver. Neem, garlic. Plan template. Record book.

				daily: appetite, activity, coat, faeces. • Conduct routine post-mortem on dead pigs • Identify cause of death and improve prevention measures. • Maintain treatment records compliant with organic certification.	• Conduct routine post-mortem on dead pigs • Identify cause and improve prevention measures. • Maintain treatment records compliant with organic certification.	
GENERAL OBJECTIVE 8.0: Understand the Nigerian premium-pork value chain.						
12-13	8.1 Explain organic-compliant slaughter at certified facility. 8.2 Describe primal cuts. 8.3 Outline organic curing options 8.4 Outline Nigerian organic pork markets 8.5 Outline regulatory compliance: NAFDAC food, NESREA waste, SON product. 8.6 Explain market geography	• Discuss organic-compliant slaughter at certified facility. • Explain primal cuts: shoulder (Boston butt, picnic), loin, belly, ham. • Discuss organic curing options: sea salt, sugar, herbs (no synthetic nitrates/nitrites in some standards; permitted with caveats in others). • Discuss Nigerian organic pork markets • Outline regulatory compliance: NAFDAC food, NESREA waste, SON product. • Explain market	Lectuer Notes whiteboard. Reference textbooks. Projector.	• Process a primal cut to retail cuts (or simulation). • Prepare a small batch of organic sausage with natural curing. • Apply slaughter, scalding, dressing, evisceration, splitting, chilling. • Apply value-addition: sausages, bacon, ham, smoked pork, organic charcuterie. • Visit a Nigerian premium pork retailer; • Document pricing. • Compose an organic pork marketing plan. • Maintain processing-batch records.	Guide students to: • Process a primal cut to retail cuts (or simulation). • Prepare a small batch of organic sausage with natural curing. • Apply slaughter, scalding, dressing, evisceration, splitting, chilling. • Apply value-addition: sausages, bacon, ham, smoked pork, organic charcuterie. • Visit a Nigerian premium pork retailer; document pricing. • Compose an organic pork marketing plan. • Maintain processing-batch records.	Pork cuts, knives. Sausage ingredients. Retail access. Plan template. Record book.

		geography				

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



ETHNO-PHYTO MEDICINE AND NUTRACEUTICAL THERAPY

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ETHNO-PHYTO MEDICINE AND NUTRACEUTICAL THERAPY	**COURSE CODE: OAP 415**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in Ethno-Phyto Medicine and Nutraceutical Therapy		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand traditional African alternative medicine concepts in organic livestock systems; 2.0 Understand the major Nigerian medicinal plants used in animal health and their therapeutic indications; 3.0 Understand the principal classes of phytochemical compounds and their pharmacological actions; 4.0 Know preparation methods for Ethno-Phyto Medicine and Nutraceutical therapy; 5.0 Know ethnoveterinary treatment of common livestock conditions; 6.0 Understand evidence-based Ethno-Phyto Medicine and Nutraceutical and clinical trial design for traditional remedies; 7.0 Know dosing, safety, contraindications, drug interactions and quality control in ethnoveterinary practice; 8.0 Know documentation, intellectual property protection and the Nagoya Protocol for traditional knowledge; 9.0 Integrate Ethno-Phyto Medicine with organic standards.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ETHNO-PHYTO MEDICINE AND NUTRACEUTICAL THERAPY	COURSE CODE: OAP 415	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in Ethno-Phyto Medicine and Nutraceutical Therapy.		
GENERAL OBJECTIVE 1.0: Understand traditional African alternative medicine concepts in organic livestock systems;		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define Ethno-Phyto medicine 1.2 Define Nutraceutical Therapy 1.3 Explain historical roots of African Ethno-Phyto medicine 1.4 Explain Ethnomedical Systems of major Nigerian ethnic groups 1.5 Explain burgeon of interest in Ethno-Phyto medicine globally	• Explain Ethno-Phyto medicine • Explain Nutraceutical Therapy • Explain historical roots of African Ethno-Phyto medicine • Explain Ethnomedical Systems of major Nigerian ethnic groups • Explain burgeon of interest in Ethno-Phyto medicine globally • Explain role in Organic Livestock • Explain advantages of Ethno-Phyto medicine	Textbook Projector Whiteboard Marker Journal Computer Internet	• Research Ethno-Phyto medicine practices in students' home regions; • Document what their families/communities use. • Compare Fulani, Yoruba and Igbo veterinary herbal traditions. • Visit in-person NIPRD or a traditional veterinary healer. • Research one specific Ethno-Phyto tradition	Guide students to; • Research Ethno-Phyto medicine practices in students' home regions; • Document what their families/communities use. • Compare Fulani vs Yoruba vs Igbo veterinary herbal traditions. • Visit in-person NIPRD or a traditional veterinary healer. • Research one specific	Research worksheets. Discussion prompts. Transport for visit. Tradition research template. Ethics discussion materials.

	1.6 Explain role in Organic Livestock 1.7 Explain advantages of Ethno-Phyto medicine 1.8 Explain limitations 1.9 Explain convergence of Ethno-Phyto with modern science 1.10 Explain Nigerian institutions for Ethno-Phyto research	• Explain limitations • Explain convergence of Ethno-Phyto with modern science • Explain Nigerian institutions for Ethno-Phyto research NIPRD (Abuja), NVRI (Vom), NACGRAB, universities.		in detail (e.g. Fulani cattle herders).	Ethno-Phyto tradition in detail (e.g. Fulani cattle herders).	
GENERAL OBJECTIVE 2.0: Understand the major Nigerian medicinal plants used in animal health and their therapeutic indications.						
2-3	3.1 Explain Neem (Azadirachta indica) 3.2 Explain Garlic (Allium sativum) 3.3 Explain Ginger (Zingiber officinale) 3.4 Explain Hibiscus (Hibiscus sabdariffa) 3.5 Explain Moringa (Moringa oleifera) 3.6 Explain Bitter leaf (Vernonia amygdalina) 3.7 Explain Scent Leaf (Ocimum gratissimum) 3.8 Explain Mahogany (Khaya senegalensis) 3.9 Explain Cashew	• Explain Neem (Azadirachta indica) • Explain Garlic (Allium sativum) • Explain Ginger (Zingiber officinale) • Explain Hibiscus (Hibiscus sabdariffa) • Explain Moringa (Moringa oleifera) • Explain Bitter leaf (Vernonia amygdalina) • Explain Scent Leaf (Ocimum gratissimum) • Explain Mahogany (Khaya senegalensis) • Explain Cashew (Anacardium occidentale). • Explain Mucuna.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify 15 medicinal plants from fresh samples • Explain their distinguishing features. • Press 10 medicinal plants; • Create personal herbarium. • Establish a medicinal plant garden at the institution farm with at least 12 species. • Interview a traditional healer or experienced herbalist • Document Ethno-Phyto practices.	Guide students to; • Identify 15 medicinal plants from fresh samples • Explain their distinguishing features. • Collect and press 10 medicinal plants; • Create personal herbarium. • Establish a medicinal plant garden at the institution farm with at least 12 species. • Interview a traditional healer or experienced herbalist • Document Ethno-	Fresh plant samples. Herbarium materials. Garden plot, seedlings. Interview guide. Fact-sheet template. Research resources.

	(Anacardium occidentale). 3.10 Explain Mucuna (Mucuna pruriens) 3.11 Explain Papaya (Carica papaya) 3.12 Explain Other Important medicinal plants: i. Aloe vera ii. Cassia spp iii. Newbouldia laevis. iv. Tetrapleura tetraptera, antispasmodic. v. Annona spp. vi. Acacia spp. vii. Sida acuta. viii. Ageratum conyzoides ix. Calotropis procera 3.13 Explain plant identification and authentication	• (Mucuna pruriens) • Explain Papaya (Carica papaya) • Explain Other Important medicinal plants: ✓ Aloe vera- wound healing, anti-microbial. ✓ Cassia spp. - laxative, anti-malarial. ✓ Newbouldia laevis- multi-purpose medicinal. ✓ Tetrapleura tetraptera - anti-microbial, antispasmodic. ✓ Annona spp. -anti-microbial. ✓ Acacia spp. - anti-diarrhoeal (tannins). ✓ Sida acuta -anti-bacterial, anti-fungal. ✓ Ageratum conyzoides - anti-microbial. ✓ Calotropis procera - anti-inflammatory. • Explain plant		• Research the active compound(s) and pharmacological action of each plant; • Identify Nigerian state ethnobotanical specialties.	Phyto practices. • Research the active compound(s) and pharmacological action of each plant; • Identify Nigerian state ethnobotanical specialties.	

		identification and authentication				
GENERAL OBJECTIVE 3.0: Understand the principal classes of phytochemical compounds and their pharmacological actions.						
4	3.1 Explain phytochemistry 3.2 Explain alkaloids 3.3 Explain flavonoids 3.4 Explain terpenes and terpenoids 3.5 Explain tannins 3.6 Explain saponins 3.7 Explain glycosides 3.8 Explain essential oils 3.9 Explain resins and balsams 3.10 Explain polysaccharides 3.11 Explain enzymes 3.12 Explain plant toxins 3.13 Explain synergy and multi-component efficacy	• Explain phytochemistry. • Explain alkaloids. • Explain flavonoids. • Explain terpenes. • Explain tannins. • Explain saponins. • Explain glycosides. • Explain essential oils. • Explain resins. • Explain fatty acids. • Explain polysaccharides. • Explain enzymes. • Explain plant toxins. • Explain synergy.	Phytochemistry charts, Textbook Projector Whiteboard Marker Journal Computer Internet.	• Conduct simple phytochemical screening on neem leaves (Shinoda), tannin test (FeCl3), saponin test (frothing). • Conduct phytochemical screening on 5 medicinal plants. • Interpret phytochemical screening results. • Correlate phytochemical content with traditional uses of plants. • Identify plant toxins that must be managed carefully in Ethno-Phyto practice.	Guide students to; • Conduct simple phytochemical screening on neem leaves (Shinoda), tannin test (FeCl3), saponin test (frothing). • Conduct phytochemical screening on 5 medicinal plants. • Interpret phytochemical screening results. • Correlate phytochemical content with traditional uses of plants. • Identify plant toxins that must be managed carefully in Ethno-Phyto practice.	Plant samples. Screening reagents. Test tubes, beakers, droppers. PPE. Result templates.
GENERAL OBJECTIVE 4.0: Know preparation methods for Ethno-Phyto Medicine and Nutraceutical therapy						
5	4.1 Explain Raw Material preparation	• Discuss raw material preparation.	Textbook Projector	• Prepare a neem leaf decoction	Guide students to; • Prepare a neem leaf	Plant materials.

	4.2 Explain decoction 4.3 Explain infusion 4.4 Explain cold infusion 4.5 Explain tincture 4.6 Explain poultice 4.7 Explain liniment 4.8 Explain ointment and salve 4.9 Explain fumigation 4.10 Explain druse (powder). 4.11 Explain bolus 4.12 Explain drench. 4.13 Explain fresh juice preparation. 4.14 Explain dosing considerations 4.15 Explain storage of prepared remedies 4.16 Explain administration routes 4.17 Explain hygiene and aseptic technique in preparation.	• Discuss decoction. • Discuss infusion. • Discuss cold infusion. • Discuss tincture. • Discuss poultice. • Discuss liniment. • Discuss ointment/salve. • Discuss fumigation. • Discuss druse. • Discuss Discuss drench. • Discuss fresh juice. • Discuss dosing. • Discuss storage. • Discuss administration routes. • Discuss hygiene.	Whiteboard Marker Journal Computer Internet	• Bottle (label). • Prepare a ginger infusion. • Prepare an alcohol tincture from bitter leaf (Vernonia). • Prepare a poultice from aloe vera for wound dressing. • Prepare a moringa ointment. • Prepare powder from dried mahogany bark; • Package • Prepare a bolus from medicinal herbs for cattle administration. • Administer a drench to a sheep or goat under supervision. • Develop a labelling system for Ethno-Phyto preparations. • Store prepared remedies appropriately • Track shelf life.	decoction • Bottle and label. • Prepare a ginger infusion. • Prepare an alcohol tincture from bitter leaf (Vernonia). • Prepare a poultice from aloe vera for wound dressing. • Prepare a moringa ointment. • Prepare powder from dried mahogany bark; • Package • Prepare a bolus from medicinal herbs for cattle administration. • Administer a drench to a sheep or goat under supervision. • Develop a labelling system for Ethno-Phyto preparations. • Store prepared remedies appropriately • Track shelf life.	Pots, jars, bottles. Alcohol, oils. Mortar and pestle. Drench gun. Labels. Storage shelves.
GENERAL OBJECTIVE 5.0: Know ethnoveterinary treatment of common livestock conditions						
6-7	5.1 Explain anthelmintic ethnoveterinary	• Explain anthelmintic. • Explain ectoparasite control.	Textbook Projector Whiteboard	• Prepare anthelmintic treatment (bitter leaf, mahogany decoction)	Guide students to; • Prepare anthelmintic treatment (bitter leaf,	Plant materials. Animal

	5.2 Explain ectoparasite control 5.3 Explain wound care. 5.4 Explain diarrhea treatment 5.5 Explain respiratory conditions 5.6 Explain fever management 5.7 Explain mastitis combined with strict hygiene. 5.8 Explain skin conditions 5.9 Explain poultry diseases 5.10 Explain rumen issues in cattle 5.11 Explain reproductive issues. 5.12 Explain analgesia and inflammation 5.13 Explain immune support and tonics 5.14 Explain combination treatments 5.15 Explain follow-up and outcome monitoring. 5.16 Explain when to refer	• Explain wound care. • Explain diarrhea. • Explain respiratory. • Explain fever. • Explain mastitis. • Explain skin conditions. • Explain poultry diseases. • Explain rumen issues. • Explain reproductive. • Explain analgesia. • Explain immune support. • Explain combinations. • Explain follow-up. • Explain referral.	Marker Journal Computer Internet	• Administer to sheep with worms • Treat wound on a sample animal with aloe vera + scent leaf poultice • Monitor healing. • Treat diarrhea in calves with mahogany bark decoction. • Treat respiratory issues in chickens with garlic in drinking water. • Prepare treatment to a cow with subclinical mastitis • Apply mastitis treatment to a cow with subclinical mastitis. • Prepare immune-boosting moringa-leaf meal supplement for animals. • Conduct ethnoveterinary case management on actual sick animals (with supervisor). • Develop a treatment protocol manual for	mahogany decoction) • Administer to sheep with worms • Treat wound on a sample animal with aloe vera + scent leaf poultice • Monitor healing. • Treat diarrhea in calves with mahogany bark decoction. • Treat respiratory issues in chickens with garlic in drinking water. • Prepare treatment to a cow with subclinical mastitis • Apply mastitis treatment to a cow with subclinical mastitis. • Prepare immune-boosting moringa-leaf meal supplement for animals. • Conduct ethnoveterinary case management on actual sick animals (with supervisor). • Develop a treatment	cases. Treatment supplies. Monitoring tools. Protocol template. Outcome documentation. Discussion materials.

				the institution farm. • Document treatment outcomes • Assess effectiveness.	protocol manual for the institution farm. • Document treatment outcomes • Assess effectiveness.	
GENERAL OBJECTIVE 6.0: Understand evidence-based Ethno-Phyto Medicine and Nutraceutical Therapy clinical trial design for traditional remedies.						
8-9	6.1 Explain evidence-based medicine 6.2 Explain levels of evidence 6.3 Explain pharmacological validation steps 6.4 Explain design of clinical trials for traditional remedies). 6.5 Explain dosage finding 6.6 Explain bio-activity assays 6.7 Explain animal models for Ethno-Phyto research. 6.8 Explain ethics in Ethno-Phyto research 6.9 Explain Nigerian published research on key Ethno-Phyto 6.10 Explain gaps in evidence 6.11 Explain career	• Discuss evidence-based medicine. • Discuss levels of evidence. • Discuss pharmacological validation steps • Discuss design of clinical trials for traditional remedies (revisit OAP 322). • Discuss dosage finding • Discuss bio-activity assays • Discuss animal models for ethnoveterinary research. • Discuss ethics in Ethno-Phyto research • Discuss Nigerian published research on key ethnoveterinary plants • Discuss gaps in evidence • Discuss career opportunities in Ethno-Phyto research at NIPRD, NVRI, universities, pharma companies. • Discuss commercial	Sample research papers. NIPRD references. Reference textbooks. Projector.	• Conduct a literature review on the antimicrobial efficacy of one ethnoveterinary plant. • Design a clinical trial protocol to test neem efficacy against helminthiasis in goats. • Conduct a simple in-vitro antibacterial assay (zone of inhibition) on plant extracts • Interpret published research on ethnoveterinary efficacy. • Visit in-person NIPRD or a university research laboratory working on ethnoveterinary plants.	Guide students to; • Conduct a literature review on the antimicrobial efficacy of one ethnoveterinary plant. • Design a clinical trial protocol to test neem efficacy against helminthiasis in goats. • Conduct a simple in-vitro antibacterial assay (zone of inhibition) on plant extracts • Interpret published research on ethnoveterinary efficacy. • Visit in-person NIPRD or a university research laboratory working	Research literature. Trial protocol template. Microbiology lab access. Research papers. Transport for visit. Research gap template.

	opportunities in Ethno-Phyto research at NIPRD, NVRI, universities, pharma companies. 6.12 Explain commercial products from Ethno-Phyto research.	products from Ethno-Phyto research		• Identify three ethnoveterinary plants where more research is needed.	on ethnoveterinary plants. • Identify three ethnoveterinary plants where more research is needed.	
GENERAL OBJECTIVE 7.0: Know dosing, safety, contraindications, drug interactions and quality control in Ethno-Phyto practice.						
10-11	7.1 Explain dosing factors 7.2 Explain dosing calculations 7.3 Explain therapeutic index 7.4 Explain safety classification 7.5 Explain common plant toxicities 7.6 Explain animal species sensitivity differences 7.7 Explain drug interactions 7.8 Explain contraindications 7.9 Explain side effects monitoring 7.10 Explain withdrawal periods 7.11 Explain quality	• Explain dosing factors. • Explain dosing calculations. • Explain therapeutic index. • Explain safety classification. • Explain plant toxicities. • Explain species sensitivity. • Explain drug interactions. • Explain contraindications. • Explain side effects monitoring. • Explain withdrawal periods. • Explain quality control. • Explain storage quality. • Explain labelling. • Explain NAFDAC regulations. • Explain record-keeping.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Calculate doses of common Ethno-Phyto remedies for different species and weights. • Develop a safety profile for each of 5 plants commonly used at institution farm. • Conduct quality control on plant material • Design labels for ethnoveterinary preparations including dose, indications, contraindications, batch. • Develop withdrawal period table for	Guide students to; • Calculate doses of common Ethno-Phyto remedies for different species and weights. • Develop a safety profile for each of 5 plants commonly used at institution farm. • Conduct quality control on plant material • Design labels for ethnoveterinary preparations including dose, indications, contraindications, batch. • Develop withdrawal	Dosing calculator. Toxic plant atlas. Safety profile template. QC checklist. Label templates. Withdrawal period template. Treatment record template. NAFDAC documents.

	control of plant material 7.12 Explain storage quality 7.13 Explain labelling of Ethno-Phyto products. 7.14 Explain regulations 7.15 Explain record-keeping of treatments			ethnoveterinary products affecting milk, eggs and meat. • Maintain treatment records for one month of farm operations. • Review NAFDAC regulation requirements for selling ethnoveterinary products commercially.	period table for ethnoveterinary products affecting milk, eggs and meat. • Maintain treatment records for one month of farm operations. • Review NAFDAC regulation requirements for selling ethnoveterinary products commercially.	
GENERAL OBJECTIVE 8.0: Know documentation, intellectual property protection and the Nagoya Protocol for traditional knowledge.						
12-13	8.1 Explain importance of documenting traditional practices 8.2 Explain documentation methods 8.3 Explain ethical documentation 8.4 Explain intellectual property issues 8.5 Explain Nagoya protocol (under the Convention on Biological Diversity) 8.6 Explain biopiracy 8.7 Explain benefit-	• Discuss documentation importance. • Discuss documentation methods. • Discuss ethical documentation. • Discuss IP issues. • Discuss Nagoya Protocol. • Discuss biopiracy. • Discuss benefit-sharing. • Discuss geographic indications. • Discuss patenting. • Discuss collective vs individual rights. • Discuss AU model law.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Document at least 5 ethnoveterinary recipes from local healers • Obtain consent. • Develop a benefit-sharing agreement for commercializing a traditional remedy. • Visit in-person NACGRAB, FIIRO NIPRD ethnobotany section. • Identify Nigerian medicinal plants that could be protected	Guide students to; • Document at least 5 ethnoveterinary recipes from local healers • Obtain consent. • Develop a benefit-sharing agreement for commercializing a traditional remedy. • Visit in-person NACGRAB, FIIRO NIPRD ethnobotany section. • Identify Nigerian medicinal plants that	Consent forms. Documentation template. Agreement template. Case studies. Transport for visit. Geographic indication framework. Business model

	sharing agreements with knowledge holders. 8.8 Explain geographic indications 8.9 Explain patenting dilemmas 8.10 Explain collective rights vs individual rights. 8.11 Explain African Union model law on access and benefit-sharing. 8.12 Explain case studies 8.13 Explain Nigerian context 8.14 Explain ethical business models that respect knowledge holders	• Discuss case studies. • Discuss Nigerian context. • Discuss ethical business models.		via geographic indication.	could be protected via geographic indication.	template.
GENERAL OBJECTIVE 9.0: Integrate Ethno-Phyto Medicine with organic standards, including permit/restriction frameworks						
14-15	9.1 Explain role of Organic Ethno-Phyto practice in integrated animal health management 9.2 Explain organic standards on Ethno-Phyto 9.3 Explain specific	• Discuss role of Organic Ethno-Phyto practice in integrated animal health management • Discuss organic standards on Ethno-Phyto • Discuss specific restrictions • Discuss complementarity	Organic standards on phytotherapy. Decision framework templates. Projector.	• Develop an integrated animal-health protocol for the institution farm combining preventive, Ethno-Phyto practice, and allopathic interventions.	Guide students to; • Develop an integrated animal-health protocol for the institution farm combining preventive, Ethno-Phyto practice, and allopathic	Integrated protocol template. Standards documents. Audit documentation system. Training

	restrictions 9.4 Explain complementarity 9.5 Explain decision framework 9.6 Explain veterinarian-Ethno-Phyto collaborations 9.7 Explain recording ethnoveterinary treatments for organic audit (revisit OAP 321 GO 6.0). 9.8 Explain training farmers and herders in Organic Ethno-Phyto practice. 9.9 Explain community-based animal health workers using Organic Ethno-Phyto practice. 9.10 Explain opportunities 9.11 Explain career pathways 9.12 Explain Nigerian regulatory framework 9.13 Explain future of Organic Ethno-Phyto practice in Nigeria	• Discuss decision framework • Discuss veterinarian-Ethno-Phyto collaborations • Discuss recording ethnoveterinary treatments for organic audit (revisit OAP 321 GO 6.0). • Discuss training farmers and herders in Organic Ethno-Phyto practice. • Discuss community-based animal health workers using Organic Ethno-Phyto practice. • Discuss opportunities • Discuss career pathways • Discuss Nigerian regulatory framework • Discuss future of Organic Ethno-Phyto practice in Nigeria		• Review organic standards (IFOAM, NOAN, EU 2018/848) on phytotherapy • Identify any restrictions on specific herbs. • Prepare for organic audit by documenting all ethnoveterinary treatments at the institution farm. • Develop a training session for farmers on basic Organic Ethno-Phyto preparation. • Develop a business plan for an Organic Ethno-Phyto product company. • Undertake an integrated Organic Ethno-Phyto case-management project on a farm condition; • Prepare a 10–15-page case report covering identification, traditional knowledge basis, preparation, administration, outcome, lessons	interventions. • Review organic standards (IFOAM, NOAN, EU 2018/848) on phytotherapy • Identify any restrictions on specific herbs. • Prepare for organic audit by documenting all ethnoveterinary treatments at the institution farm. • Develop a training session for farmers on basic Organic Ethno-Phyto preparation. • Develop a business plan for an Organic Ethno-Phyto product company. • Undertake an integrated Organic Ethno-Phyto case-management project on a farm condition; • Prepare a 10–15-page case report covering identification, traditional knowledge basis, preparation,	materials. Business plan template. Capstone rubric. Practical exam materials.

				learnt. • Identify 10 plants for herbal treatment • Prepare 3 remedies • Administer 1 treatment under supervision.	administration, outcome, lessons learnt. • Identify 10 plants for herbal treatment • Prepare 3 remedies Administer 1 treatment under supervision.	
Course Assessment: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

ORGANIC APICULTURE AND HIVE PRODUCTS

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC APICULTURE AND HIVE PRODUCTS	**COURSE CODE: OAP 416**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: I SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in organic apiculture and hive productions.		

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

1.0 Understand bee biology and the role of apiculture in Nigerian organic agriculture;
2.0 Know indigenous Nigerian and African bee subspecies, drone-laying and worker bee characteristics;
3.0 Know hive types and design;
4.0 Know apiary establishment and management under organic standards;
5.0 Know swarming, queen management, colony reproduction and re-queening;
6.0 Know bee forage management indigenous flora, planted forage, foraging zones;
7.0 Know honey harvesting, extraction, processing and quality testing;
8.0 Know production and processing of other hive products;
9.0 Know organic apiculture certification, economics and entrepreneurship.

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC APICULTURE AND HIVE PRODUCTS	COURSE CODE: OAP 416	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in organic apiculture and hive productions.		
GENERAL OBJECTIVE 1.0: Understand bee biology and the role of apiculture in Nigerian organic agriculture and food security.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Define apiculture; explain global and Nigerian honey production 1.2 Explain bee taxonomy 1.3 Explain colony organization 1.4 Explain bee life cycle 1.5 Explain Bee Communication 1.6 Explain bee physiology 1.7 Explain division OF labor within colony. 1.8 Explain ecosystem services of bees 1.9 Explain organic suitability of	• Discuss apiculture. • Discuss its significance. • Discuss taxonomy. • Discuss colony organization. • Discuss life cycle. • Discuss communication. • Discuss physiology. • Discuss division of labor. • Discuss ecosystem services. • Discuss organic suitability.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Examine specimens of queen, worker, drone under magnifier. • Visit the institution apiary • Observe foraging activity from a safe distance. • Identify bee castes and structures (sting, wax glands, pollen basket). • Estimate the pollination value of a colony for a 1-ha cucurbit field.	Guide students to; • Examine specimens of queen, worker, drone under magnifier. • Visit the institution apiary • Observe foraging activity from a safe distance. • Identify bee castes and structures (sting, wax glands, pollen basket). • Estimate the pollination value of a colony for a 1-ha cucurbit field.	Bee specimens, magnifier. Institution apiary. Caste identification cards. Discussion prompts. Calculator.

	apiculture.					
GENERAL OBJECTIVE 2.0: Know indigenous Nigerian and African bee subspecies, drone-laying and worker bee characteristics.						
2	2.1 Explain Bee subspecies global distribution 2.2 Explain Apis mellifera adansonii 2.3 Explain A. m. scutellata 2.4 Explain characteristics of African bees 2.5 Explain management implications of African bee characteristics. 2.6 Explain identification of bees 2.7 Explain Nigerian bee distribution 2.8 Explain stingless bees (Meliponini) 2.9 Explain conservation of indigenous bees and threats	• Discuss bee subspecies. • Discuss A. m. adansonii. • Discuss A. m. scutellata. • Discuss African bee characteristics. • Discuss management implications. • Discuss identification. • Discuss Nigerian distribution. • Discuss stingless bees. • Discuss conservation.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify bee samples from institution apiary. • Visit in-person a bee operation • Design a Nigerian bee conservation strategy for one state. • Research and present indigenous bee management practices in students' home regions. • Compare African and European bee subspecies for organic apiculture suitability.	Guide students to; • Identify bee samples from institution apiary. • Visit in-person a bee operation • Design a Nigerian bee conservation strategy for one state. • Research and present indigenous bee management practices in students' home regions. • Compare African and European bee subspecies for organic apiculture suitability.	Bee samples, calipers. Transport for visit. Strategy template. Comparison template. PPE
GENERAL OBJECTIVE 3.0: Know hive types and design						
3-4	3.1 Explain Traditional hives in Nigeria 3.2 Explain Kenyan Top-Bar Hive (KTBH). 3.3 Explain langstroth	• Explain traditional hives. • Explain KTBH. • Explain Langstroth. • Explain TTBH.	Hive construction plans. Textbook Projector	• Inspect KTBH and Langstroth hives at institutional apiary; • Identify components.	Guide students to; • Inspect KTBH and Langstroth hives at institutional apiary; • Identify	KTBH, Langstroth hives. Construction tools, timber.

	hive 3.4 Explain Tanzanian Top-Bar Hive (TTBH) 3.5 Explain hive components 3.6 Explain comparison of hive types 3.7 Explain construction of KTBH 3.8 Explain construction of Langstroth components. 3.9 Explain hive materials 3.10 Explain hive treatment 3.11 Explain hive stands 3.12 Explain organic hive design considerations	• Explain hive components. • Explain comparison. • Explain KTBH construction. • Explain Langstroth construction. • Explain materials. • Explain hive treatment. • Explain hive stands. • Explain organic hive considerations.	Whiteboard Marker Journal Computer Internet	• Construct a Kenyan Top-Bar Hive using local timber. • Construct Langstroth frames and assemble a brood box. • Install a beehive stand with ant moats. • Prepare hives with beeswax-melt coating before installing colonies. • Design an organic-compliant apiary layout with 10 hives. • Compare cost-benefit of KTBH vs Langstroth for a Nigerian smallholder.	components. • Construct a Kenyan Top-Bar Hive using local timber. • Construct Langstroth frames and assemble a brood box. • Install a beehive stand with ant moats. • Prepare hives with beeswax-melt coating before installing colonies. • Design an organic-compliant apiary layout with 10 hives. • Compare cost-benefit of KTBH vs Langstroth for a Nigerian smallholder.	Beeswax, brushes. Stand materials. Layout template. Cost-benefit worksheet.
GENERAL OBJECTIVE 4.0: Know apiary establishment and management under organic standards.						
5	4.1 Explain site selection for apiary 4.2 Explain organic apiary site requirements 4.3 Explain Apiary Layout 4.4 Explain number of	• Discuss site selection. • Discuss organic site requirements. • Discuss apiary layout. • Discuss number of hives.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Assess the institutional apiary site; • Identify strengths and limitations under organic standards. • Install bait hives for	Guide students to; • Assess the institutional apiary site; • Identify strengths and limitations under organic standards.	Apiary site. Bait hives. Inspection records. Smoker, fuel. PPE. Forage chart. Management

	Hives per site 4.5 Explain Colony Acquisition 4.6 Explain baiting swarms with wax-coated bait hives 4.7 Explain Hive installation 4.8 Explain Routine Inspection 4.9 Explain safety 4.10 Explain Seasonal Management 4.11 Explain Record-Keeping 4.12 Explain organic compliance documentation	• Discuss colony acquisition. • Discuss swarm baiting. • Discuss hive installation. • Discuss routine inspection. • Discuss safety. • Discuss seasonal management. • Discuss record-keeping. • Discuss compliance documentation.		swarm catching. • Conduct routine inspection of each colony at the institution apiary; • Record findings. • Light a smoker properly; • Demonstrate emergency response for severe stinging. • Monitor flowering patterns of forage plants over the season. • Develop hive inspection records for the institution apiary. • Develop an organic apiary management plan for the institution farm.	• Install bait hives for swarm catching. • Conduct routine inspection of each colony at the institution apiary; • Record findings. • Light a smoker properly; • Demonstrate emergency response for severe stinging. • Monitor flowering patterns of forage plants over the season. • Develop hive inspection records for the institution apiary. • Develop an organic apiary management plan for the institution farm.	plan template.
GENERAL OBJECTIVE 5.0: Know swarming, queen management, colony reproduction and re-queening.						
6-7	5.1 Define swarming 5.2 Explain Swarming Triggers 5.3 Explain Swarm Prevention 5.4 Explain Swarm Capture.	• Explain swarming. • Explain swarming triggers. • Explain swarm prevention. • Explain swarm capture.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify queen, queen cells, drone cells in colonies. • Mark a Queen with appropriate colour code. • Split a strong	Guide students to; • Identify Queen, queen cells, drone cells in colonies. • Mark a Queen with appropriate colour code.	Active colonies. Queen markers, paint. Splitting equipment. Swarm catcher.

	5.5 Explain absconding 5.6 Explain Queen biology 5.7 Explain Queen Cell 5.8 Explain Artificial Splitting 5.9 Explain Queen introduction 5.10 Explain Re-Queening 5.11 Explain Queen rearing for breeding 5.12 Explain colony size management 5.13 Explain laying workers (drone laying) 5.14 Explain organic restrictions	• Explain absconding. • Explain Queen biology. • Explain Queen cells. • Explain splitting. • Explain Queen introduction. • Explain re-queening. • Explain queen rearing. • Explain colony size management. • Explain laying workers. • Explain organic restrictions.		colony into two; rear new Queen. • Capture a swarm and introduce to a hive. • Introduce a new Queen to a Queenless colony. • Monitor colonies for swarming preparation; • Develop a swarming-management protocol for the institution apiary. • Develop a Queen-rearing plan.	• Split a strong colony into two; rear new Queen. • Capture a swarm and introduce to a hive. • Introduce a new Queen to a Queenless colony. • Monitor colonies for swarming preparation. • Develop a swarming-management protocol for the institution apiary. • Develop a Queen-rearing plan.	Queen cages. Protocol template. Plan template.
GENERAL OBJECTIVE 6.0: Know bee forage management indigenous flora, planted forage, foraging zones.						
8-9	6.1 Explain bee forage. 6.2 Explain major Nigerian bee forage plants: ✓ Forest: ✓ Guinea savanna ✓ Sudan/Sahel ✓ Crops 6.3 Explain forage calendar 6.4 Explain mono-floral vs multi-floral honey	• Explain bee forage. • Explain major Nigerian bee forage plants: ✓ Forest: ✓ Guinea savanna ✓ Sudan/Sahel ✓ Crops • Explain forage calendar • Explain mono-floral	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify bee forage plants. • Develop a forage calendar for the institutional apiary site. • Establish a small pollinator-friendly garden. • Set up water sources for bees. • Assess organic-	• Identify bee forage plants. • Develop a forage calendar for the institutional apiary site. • Establish a small pollinator-friendly garden. • Set up water sources for bees. • Assess organic-	Forage plant identification guide. Calendar template. Garden plants/seeds. Water containers. Compliance checklist. Proposal

	types and their market values. 6.5 Explain planted forage 6.6 Explain Agroforestry systems supporting apiculture. 6.7 Explain Pollination services 6.8 Explain Threats to bee forage 6.9 Explain organic forage compliance 6.10 Explain water provision for bees. 6.11 Explain feeding bees	vs multi-floral honey types and their market values. • Explain planted forage • Explain Agroforestry systems supporting apiculture. • Explain Pollination services • Explain Threats to bee forage • Explain organic forage compliance		forage compliance of the institution site. • Develop a pollination services proposal for a nearby cucumber/sunflower farm. • Identify Nigerian high-value mono-floral honeys (shea, acacia, citrus).	forage compliance of the institution site. • Develop a pollination services proposal for a nearby cucumber/sunflower farm. • Identify Nigerian high-value mono-floral honeys (shea, acacia, citrus).	template.
GENERAL OBJECTIVE 7.0: Know honey harvesting, extraction, processing and quality testing.						
10-11	7.1 Explain harvest timing 7.2 Explain harvest frequency in Nigeria 7.3 Explain harvest equipment 7.4 Explain harvest techniques 7.5 Explain traditional harvest (destructive) 7.6 Explain uncapping 7.7 Explain extraction. 7.8 Explain straining & settling	• Discuss harvest timing. • Discuss harvest frequency. • Discuss harvesting equipment. • Discuss harvesting techniques. • Discuss traditional harvest. • Discuss uncapping. • Discuss extraction. • Discuss straining/settling.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Harvest honey from institution apiary using modern (non-destructive) techniques. • Uncap frames using hot knife method. • Extract honey using centrifugal extractor. • Strain and settle honey for 1–2 days. • Measure honey moisture using	Guide students • Harvest honey from institution apiary using modern (non-destructive) techniques. • Uncap frames using hot knife method. • Extract honey using centrifugal extractor. • Strain and settle honey for 1–2 days. • Measure honey	Hives ready for harvest. Extractor, knife. Strainer. Tanks. Refractometer. Quality test reagents. Glass jars, labels. Label design software. HACCP

	7.9 Explain honey quality parameters 7.10 Explain honey adulteration 7.11 Explain organic honey criteria 7.12 Explain packaging and labelling 7.13 Explain storage 7.14 Explain honey shelf life	• Discuss quality parameters. • Discuss adulteration. • Discuss organic criteria. • Discuss packaging/labelling. • Discuss storage. • Discuss shelf life.		refractometer. • Conduct simple honey quality tests — acidity, sugar content, sensory evaluation. • Test for honey adulteration using simple methods. • Package honey in glass jars; • Design organic-compliant label.	moisture using refractometer. • Conduct simple honey quality tests — acidity, sugar content, sensory evaluation. • Test for honey adulteration using simple methods. • Package honey in glass jars; • Design organic-compliant label.	template.
GENERAL OBJECTIVE 8.0: Know production and processing of other hive products.						
12-13	8.1 Explain beeswax 8.2 Explain beeswax harvesting 8.3 Explain beeswax processing 8.4 Explain beeswax uses 8.5 Explain propolis 8.6 Explain propolis harvesting 8.7 Explain propolis processing 8.8 Explain propolis uses. 8.9 Explain royal jelly 8.10 Explain royal jelly harvesting 8.11 Explain pollen	• Explain beeswax. • Explain beeswax harvesting. • Explain beeswax processing. • Explain beeswax uses. • Explain propolis. • Explain propolis harvesting. • Explain propolis processing. • Explain propolis uses. • Explain royal jelly. • Explain royal jelly	Textbook Projector Whiteboard Marker Journal Computer Internet	• Process beeswax from capping using solar wax melter; • Mould into bars. • Make a beeswax candle or natural lip balm. • Install propolis trap; • Collect propolis after 4–6 weeks. • Prepare propolis tincture (alcohol extraction). • Install pollen trap; • Collect pollen.	Guide students to; • Process beeswax from capping using solar wax melter; • Mould into bars. • Make a beeswax candle or natural lip balm. • Install propolis trap; • Collect propolis after 4–6 weeks. • Prepare propolis tincture (alcohol extraction). • Install pollen trap;	Solar wax melter, moulds. Candle wicks, oils. Propolis traps. Alcohol, jars. Pollen traps. Dryer, packaging. Plan template.

	8.12 Explain pollen harvesting 8.13 Explain pollen processing 8.14 Explain bee venom 8.15 Explain market value 8.16 Explain organic compliance for each product.	harvesting. • Explain pollen. • Explain pollen harvesting. • Explain pollen processing. • Explain bee venom. • Explain market value. • Explain organic compliance.		• Dry pollen • Package pollen. • Develop a complete hive-product value-addition plan for the institution apiary.	• Collect pollen. • Dry and package pollen. • Develop a complete hive-product value-addition plan for the institution apiary.	
GENERAL OBJECTIVE 9.0: Know organic apiculture certification, economics and entrepreneurship.						
14-15	9.1 Explain organic apiculture certification requirements 9.2 Explain key organic requirements 9.3 Explain allowed treatments for organic apiculture 9.4 Explain prohibited treatments 9.5 Explain conversion period 9.6 Explain certification process for apiculture 9.7 Explain common pests and diseases 9.8 Explain organic pest/disease management	• Discuss organic apiculture requirements. • Discuss allowed treatments. • Discuss prohibited treatments. • Discuss conversion. • Discuss certification. • Discuss pests/diseases. • Discuss organic pest management. • Discuss economics. • Discuss enterprise budget. • Discuss	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify common bee pests and diseases on samples. • Apply an organic-compliant varroa treatment (oxalic acid or essential oil). • Assess the institution apiary against organic certification requirements; • Identify gaps. • Develop an enterprise budget for a 50-hive organic apiary over 3 years.	Guide students to; • Identify common bee pests and diseases on samples. • Apply an organic-compliant varroa treatment (oxalic acid or essential oil). • Assess the institution apiary against organic certification requirements; • Identify gaps. • Develop an enterprise budget for a 50-hive organic apiary over	Pest specimens. Organic treatments. Compliance checklist. Budget template. Business plan template.

	9.9 Explain economics of apiculture in Nigeria 9.10 Explain enterprise budget for 20-hive apiary; ROI in 12–18 months. 9.11 Explain beekeeping cooperatives and the value of group certification (revisit 9.12 Explain entrepreneurship 9.13 Explain Nigerian beekeeping institutions. 9.14 Explain career pathways 9.15 Explain export opportunities	cooperatives. • Discuss entrepreneurship. • Discuss institutions. • Discuss career pathways. • Discuss export. • Conduct capstone.		• Develop a NIBA membership and engagement plan. • Develop a complete business plan for an organic apiculture enterprise (15–20 pages); covering production, processing, hive products, marketing, financing.	3 years. • Develop a NIBA membership and engagement plan. • Develop a complete business plan for an organic apiculture enterprise (15–20 pages); covering production, processing, hive products, marketing, financing.	

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

YEAR II SEMESTER II

APPLIED ORGANIC ANIMAL NUTRITION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: APPLIED ORGANIC ANIMAL NUTRITION	**COURSE CODE: OAP 421**	**CONTACT HOURS: 3 HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in applied organic animal nutrition		
GENERAL OBJECTIVES: On completion of the course, the students should be able to: 1.0 Know the principles of applied organic animal nutrition; 2.0 Understand nutrient-requirement systems (NRC, NIAS, NOAN) to organic species; 3.0 Know balanced organic diets by Pearson square, least-cost and feed formulation software; 4.0 Know feeds composition by proximate, Van Soest, in-vitro and advanced laboratory techniques (HPLC); 5.0 Know non-conventional feed resources for Nigerian organic systems; 6.0 Know mycotoxin contamination under organic standards; 7.0 Operate a certified organic feed-mill.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: APPLIED ORGANIC ANIMAL NUTRITION	COURSE CODE: OAP 421	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in applied organic animal nutrition.		
GENERAL OBJECTIVE 1.0: Know the principles of applied organic animal nutrition.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Explain organic feed regulations. 1.2 Outline the percentage organic feed requirements: 1.3 Explain prohibited inputs 1.4 Explain permitted inputs 1.5 Explain traceability 1.6 Explain the economic implications 1.7 Explain the importance of organic feed production for certification.	• Explain organic feed regulations. • Discuss the percentage organic feed requirements: • Discuss prohibited inputs • Discuss permitted inputs • Explain traceability: feed-purchase records, supplier certificates. • Explain the economic implications • Explain the importance of organic feed production for.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Compose a one-page summary of organic feed rules. • Audit an institution feed store for organic compliance. • Profile NAFDAC feed regulations. • Discuss the case for organic feed production.	Guide students to: • Compose a one-page summary of organic feed rules. • Audit an institution feed store for organic compliance. • Profile NAFDAC feed regulations. • Discuss the case for organic feed production.	Summary template. Audit checklist. NAFDAC documents. Discussion materials.

GENERAL OBJECTIVE 2.0: Understand nutrient-requirement systems to organic species.						
2-3	2.1 Explain nutrient-requirement systems. 2.2 Explain maintenance requirements 2.3 Explain growth requirements 2.4 Explain gestation and lactation requirements. 2.5 Explain requirement multipliers for environment. 2.6 Explain requirement adjustment for organic systems 2.7 Explain nutrient requirement tables for species and feed-composition tables for Nigerian feeds.	• Discuss nutrient-requirement systems. • Discuss maintenance requirements: ME, CP, Ca, P based on body weight. • Discuss growth requirements: ADG dependent. • Explain gestation and lactation requirements. • Explain requirement multipliers for environment. • Explain requirement adjustment for organic systems • Explain nutrient requirement tables for species and feed-composition tables for Nigerian feeds.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Calculate maintenance, growth, gestation, lactation requirements for organic cow. • Calculate DMI for 5 species/classes. • Apply heat-stress multiplier for Sahel conditions. • Compile a Nigerian feed-composition reference sheet. • Calculate requirements for sample case studies	Guide students to: • Calculate maintenance, growth, gestation, lactation requirements organic cow. • Calculate DMI for 5 species/classes. • Apply heat-stress multiplier for Sahel conditions. • Compile a Nigerian feed-composition reference sheet. • Calculate requirements for sample case studies	Nutrient requirement tables, Calculator. Climate data. Organic feed ingredients Composition Tables
GENERAL OBJECTIVE 3.0: Know balanced organic diets by Pearson square, feed formulation software						
4-6	3.1 Describe organic feed ingredient 3.2 Explain the classification of feed ingredients 3.3 Explain diet-formulation methods:	• Discuss organic feed ingredient • Discuss the classification of feed ingredients • Discuss diet-formulation methods:	Textbook Projector Whiteboard Marker Journal Computer Internet	• Formulate diets for 5 species by Pearson square. • Apply Pearson square for 2-ingredient mixtures (protein-balancing).	Guide students to: • Formulate diets for 5 species by Pearson square. • Apply Pearson square for 2-ingredient mixtures (protein-	Calculator. Software access. Portfolio rubric. Logbook.

	Pearson square, simultaneous equations, linear programming (least-cost).	Pearson square, simultaneous equations, linear programming (least-cost).		• Apply double Pearson square for 4-ingredient mixtures. • Formulate complex multi-ingredient diets. • Apply Excel-based or open-source software (Feed Wizard, ZooEasy, BestMix) for least-cost. • Formulate dairy cow ration: 16 % CP; 65 % TDN; balanced Ca:P 1.5–2:1. • Formulate beef cattle finisher: 12–14 % CP; 70 % TDN. • Formulate sheep/goat diets: 14–16 % CP for growth; 18 % for lactation. • Formulate swine grower/finisher: 18 %/16 % CP. • Formulate broiler starter/grower/finisher: 22 %/20 %/18 % CP. • Compose a complete organic feed-formulation portfolio. • Maintain a formulation logbook.	balancing). • Apply double Pearson square for 4-ingredient mixtures. • Apply trial-and-error for complex multi-ingredient diets. • Apply Excel-based or open-source software (Feed Wizard, ZooEasy, BestMix) for least-cost. • Formulate dairy cow ration: 16 % CP; 65 % TDN; balanced Ca:P 1.5–2:1. • Formulate beef cattle finisher: 12–14 % CP; 70 % TDN. • Formulate sheep/goat diets: 14–16 % CP for growth; 18 % for lactation. • Formulate swine grower/finisher: 18 %/16 % CP. • Formulate broiler starter/grower/finisher: 22 %/20 %/18 % CP. • Compose a complete organic feed-formulation portfolio • Maintain a formulation	

					logbook.	
GENERAL OBJECTIVE 4.0: Know feed quality and nutrient evaluation methods						
7	4.1 Explain sensory evaluation: aroma, colour, particle size. 4.2 Explain rapid feed-quality assessment 4.3 Explain laboratory techniques for organic feed evaluation 4.4 Explain digestibility methods and energy partitioning 4.5 Explain feed-evaluation records.	• Explain sensory evaluation: aroma, colour, particle size. • Explain rapid feed-quality assessment (mould, contaminants) • Explain laboratory techniques for organic feed evaluation • Explain digestibility methods and energy partitioning • Explain feed-evaluation records.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct proximate analysis on a feed sample. • Apply proximate (Weende) analysis to feed samples: moisture, ash, CP, CF, EE, NFE. • Conduct Van Soest detergent fibre: NDF, ADF, ADL. • Calculate digestible nutrients: TDN, DE, ME, NE. • Apply in-vitro DM digestibility (IVDMD) by Tilley-Terry method. • Apply in-vitro gas production (Menke). • Apply nylon-bag technique (in sacco) for ruminal degradability. • Apply IVDMD on a forage sample. • Calculate TDN and ME. • Maintain a feed-evaluation log.	Guide students to: • Conduct proximate analysis on a feed sample. • Apply proximate (Weende) analysis to feed samples: moisture, ash, CP, CF, EE, NFE. • Conduct Van Soest detergent fibre: NDF, ADF, ADL. • Calculate digestible nutrients: TDN, DE, ME, NE. • Apply in-vitro DM digestibility (IVDMD) by Tilley-Terry method. • Apply in-vitro gas production (Menke). • Apply nylon-bag technique (in sacco) for ruminal degradability. • Apply IVDMD on a forage sample. • Calculate TDN and ME. • Maintain a feed-	Lab equipment. Reagents. Invitro Dry Matter Digestibility(IVDMD) equipment. Calculator. Logbook.

					evaluation log.	
GENERAL OBJECTIVE 5.0: Know non-conventional feed resources for Nigerian organic systems.						
8-9	5.1 Explain Nigerian non-conventional feed resources. 5.2 Explain gossypol management in cottonseed. 5.3 Describe browse and fodder trees 5.4 Explain pruning, cut-and-carry, ensiling of fodder trees. 5.5 Describe aquatic plants 5.6 Describe fermented feeds. 5.7 Explain ash, charcoal as feed additives.	• Discuss Nigerian non-conventional feed resources. • Explain gossypol management in cottonseed: heat treatment, dilution. • Explain browse and fodder trees: Leucaena, Gliricidia, Moringa, Tithonia, Faidherbia. • Explain pruning, cut-and-carry, ensiling of fodder trees. • Explain aquatic plants: water lettuce, water hyacinth (controlled use). • Explain fermented foods: rumen-content fermentation, ensiled by-products. • Explain ash, charcoal as feed additives.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify 10 Nigerian NCFRs. • Apply HCN management on High Quality Cassava Peel (HQCP). • Set up a small BSF larvae production trial. • Apply pruning of a fodder tree. • Develop insect protein (Black Soldier Fly larvae — BSF — Hermetia illucens): on-farm production from food/farm waste. • Compose an NCFR-based diet for a 100-bird organic broiler operation.	Guide students to: • Identify 10 Nigerian NCFRs. • Apply HCN management on cassava. • Set up a small BSF larvae production trial. • Apply pruning of a fodder tree. • Develop insect protein (Black Soldier Fly larvae — BSF — Hermetia illucens): on-farm production from food/farm waste. • Compose an NCFR-based diet for a 100-bird organic broiler operation.	Feed samples. Cassava, equipment. BSF substrate. Tree access. Diet template.
GENERAL OBJECTIVE 6.0: Know mycotoxin contamination under organic standards.						
11	7.1 Explain major mycotoxins of Nigerian feeds 7.2 Outline pre-harvest,	• Explain major mycotoxins of Nigerian feeds • Discuss pre-harvest,	Textbook Projector Whiteboard Marker	• Apply LFA aflatoxin screening on feed. • Inspect a feed store; recommend GSP	Guide students to: • Apply LFA aflatoxin screening on feed. • Inspect a feed store;	LFA kit. Feed store. Binders. Screening kits

	post-harvest and storage factors influencing mycotoxin levels. 7.3 Explain Good Agricultural Practices (GAP) and Good Storage Practices (GSP). 7.4 Explain effects of moisture and temperature in fungal growth. 7.5 Explain permitted mycotoxin binders under organic standards 7.6 Explain NAFDAC and SON aflatoxin Maximum Residue Limits (MRL) 7.7 Explain integrated mycotoxin management programme for a Nigerian organic feed-mill.	post-harvest and storage factors influencing mycotoxin levels. • Discuss Good Agricultural Practices (GAP) and Good Storage Practices (GSP). • Explain effects of moisture and temperature in fungal growth. • Explain permitted mycotoxin binders under organic standards • Explain NAFDAC and SON aflatoxin Maximun Residue limits (MRL). • Explain integrated mycotoxin management programme for a Nigerian organic feed-mill.	Journal Computer Internet	improvements. • Use moisture meters and visual inspection • Apply a permitted binder to a contaminated sample (demo). • Compose a mycotoxin management programme.	recommend GSP improvements. • Use moisture meters and visual inspection • Apply a permitted binder to a contaminated sample (demo). • Compose a mycotoxin management programme.	Storage materials/units Programme template.
GENERAL OBJECTIVE 7.0: Operate a certified organic feed-mill.						
14-15	9.1 Describe organic feed-mill design 9.2 Explain feed-mill equipment	• Discuss organic feed-mill design: ingredient receiving, storage, grinding, mixing,	Mill plans. Textbook Projector Whiteboard	• Visit a Nigerian feed mill; document operations. • Apply organic-	Guide students to: • Visit a Nigerian feed mill; document operations.	Mill access. Plan rubric. Submission portal.

	9.3 Explain organic-segregation principles 9.4 Explain the importance of certification (ISO 22000, HACCP, ISO 17025). 9.5 Explain traceability 9.6 Explain bio-security 9.7 Explain quality control 9.8 Explain labelling standard 9.9 Explain successful Nigerian organic feed-mill cases 9.10 Explain Good Storage Practice (GSP)	pelleting, bagging, dispatch. • Explain fedd mill equipment: hammer/grinder mill, mixer (horizontal/vertical), pellet press, bagging machine, weighing scale. • Explain organic-segregation principles: dedicated lines for organic; segregation from conventional ingredients. • Explain the importance of ISO 22000, HACCP, ISO 17025 (if lab attached). • Explain traceability: every ingredient batch tracked from supplier to finished feed. • Explain NAFDAC, SON compliance. • Explain biosecurity: pest control without prohibited rodenticides. • Explain quality control: in-house lab testing.	Marker Journal Computer Internet.	segregation principles: dedicated lines for organic; segregation from conventional ingredients. • Apply ISO 22000, HACCP, ISO 17025 • Carryout ingredient/ product traceability • Calculate feed-mill economics: ROI, break-even, capacity • Carryout labelling • Carryout storage	• Apply organic-segregation principles: dedicated lines for organic; segregation from conventional ingredients. • Apply ISO 22000, (HACCP, ISO 17025) NAFDAC, SON compliance • Carryout ingredient/ product traceability • Calculate feed-mill economics: ROI, break-even, capacity • Carryout labelling • Carryout storage	Assessment.

		• Explain labelling: organic logo, certifier, ingredients, guaranteed analysis. • Explain successful Nigerian organic feed-mill cases • Explain Good Storage Practice (GSP).				

COURSE ASSESSMENT:

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

ORGANIC BEEF CATTLE PRODUCTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC BEEF CATTLE PRODUCTION	**COURSE CODE: OAP 422**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in organic beef-cattle production		
GENERAL OBJECTIVES: On completion of the course, the students should be able to: 1.0 Know reproductive management and breeding in organic beef herds; 2.0 Know cow-calf operations under organic standards; 3.0 Know backgrounding, fattening and finishing in beef cattle; 4.0 Know health, parasite and welfare management; 5.0 Know the premium organic-beef value chain.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC BEEF CATTLE PRODUCTION	COURSE CODE: OAP 422	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in organic beef-cattle production		
GENERAL OBJECTIVE 1.0: Know reproductive management and breeding in organic beef herds.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-3	1.1 Describe cattle reproductive parameters 1.2 Describe oestrus signs 1.3 Distinguish natural service from AI 1.4 Explain AI 1.5 Explain pregnancy diagnosis 1.6 Explain parturition management 1.7 Describe cow-calf management	• Explain cattle reproductive parameters • Explain oestrus signs: standing heat, mounting, mucus discharge, restlessness. • Distinguish natural service from AI; organic standards permit both. • Explain AI: oestrus detection, semen handling, rectovaginal insemination.	Lecture notes, Reference textbooks. Projector.	• Detect oestrus on a small herd. • Carryout AI on a cow (under supervision or simulation). • Conduct pregnancy diagnosis by rectal palpation, urine test • Carryout AI: oestrus detection, semen handling, rectovaginal insemination • Calculate reproductive efficiency: calving rate, calving interval, weaning weight • Assist in calving.	Guide students to: • Detect oestrus on a small herd. • Carryout AI on a cow (under supervision or simulation). • Conduct pregnancy diagnosis by rectal palpation. • Carryout AI: oestrus detection, semen handling, rectovaginal insemination • Calculate reproductive efficiency: calving rate, calving interval, weaning weight • Assist in calving.	Live herd. AI kit. Pregnant cow. Calving facility. Calculator. Record book.

		• Explain pregnancy diagnosis: rectal palpation • Explain parturition management: dystocia recognition, calving assistance. • Discuss cow-calf management		• Calculate calving interval and rate. • Maintain a breeding-record book.	• Calculate calving interval and rate. • Maintain a breeding-record book.	
GENERAL OBJECTIVE 2.0: Know cow-calf operations under organic standards.						
4-6	2.1 Describe care for newborn calves. 2.2 Explain BCS-scoring 1–9 throughout production cycle. 2.3 Explain heat-stress management in tropical Nigeria.	• Discuss care for newborn calves: ensure colostrum within 6 h; navel dipping; identification. • Explain BCS-scoring 1–9 throughout production cycle. • Explain heat-stress management in tropical Nigeria.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Care for newborn calves. • Carryout creep feeding. • Weigh calves and cows • Carryout BCS-score of calves and cows. • Select cows for culling. • Maintain a cow-calf record book.	Guide students to: • Care for newborn calves. • Carryout creep feeding. • Weigh and BCS-score calves and cows. • Select cows for culling. • Maintain a cow-calf record book.	Calves. Creep feed. Scale, chart. Selection criteria. Record book.
GENERAL OBJECTIVE 3.0: Know backgrounding, fattening and finishing in beef cattle.						
7-10	3.1 Explain backgrounding (post-weaning) from fattening (finishing). 3.2 Describe pasture-based fattening.	• Explain backgrounding (post-weaning) from fattening (finishing). • Explain pasture-	Textbook Projector Whiteboard Marker Journal Computer	• Weigh growing steers. • Carryout pre-slaughter handling on a group. • Calculate ADG: 0.5–1.0 kg/day on pasture; 0.8–1.2 kg/day with	Guide students to: • Weigh growing steers. • Carryout pre-slaughter handling on a group. • Calculate ADG: 0.5–1.0 kg/day on pasture; 0.8–	Scale. Handling facility. Calculator. Farm access. Plan template.

	3.3 Explain pasture and organic concentrate 3.4 Explain grass-fed and grain-fed beef characteristics 3.5 Describe silvopasture-based finishing. 3.6 Describe BSF, sweet-potato vine, fodder-tree supplementation.	based fattening. • Explain pasture and organic concentrate • Explain grass-fed and grain-fed beef characteristics • Explain silvopasture-based finishing. • Explain BSF, sweet-potato vine, fodder-tree supplementation.	Internet	organic concentrate • Calculate dressing percentage from carcass and live weight. • Manage pre-slaughter handling: low stress, fasting 12–18 h, hydration • Calculate dressing percentage (55–60 % for indigenous; 60–65 % for crossbred). • Calculate carcass yield and grade • Visit a Nigerian grass-fed operation. • Compose a finishing plan for 50 steers.	1.2 kg/day with organic concentrate • Calculate dressing percentage from carcass and live weight. • Manage pre-slaughter handling: low stress, fasting 12–18 h, hydration • Calculate dressing percentage (55–60 % for indigenous; 60–65 % for crossbred). • Calculate carcass yield and grade • Visit a Nigerian grass-fed operation. • Compose a finishing plan for 50 steers.	
GENERAL OBJECTIVE 4.0: Know health, parasite and welfare management.						
11-12	4.1 Explain bio-security 4.2 Explain vaccination schedule 4.3 Explain parasite management 4.4 Explain welfare assessment 4.5 Explain low-stress handling and stockmanship. 4.6 Explain herd-health records.	• Explain bio-security • Discuss vaccination schedule • Explain parasite management • Explain welfare assessment: 5 freedoms; behavioural indicators.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Carry out vaccination on cattle. • Conduct faecal sampling and parasite check. • Carry out organic endo and ectoparasite management. • Conduct welfare audit on a herd. • Compose a herd-health plan for 50 cows.	Guide students to: • Apply vaccination on cattle. • Conduct faecal sampling and parasite check. • Carry out organic endo and ectoparasite management. • Conduct welfare audit on a herd. • Compose a herd-health plan for 50 cows.	Vaccine, syringe. Faecal kits. Tick treatment. Audit checklist. Plan template.

	4.7 Explain zoonoses with examples	• Discuss low-stress handling and stockmanship. • Explain herd-health records. • Explain zoonoses with examples				
GENERAL OBJECTIVE 5.0: Know the premium organic-beef value chain.						
13-15	5.1 Explain slaughter 5.2 Explain cold chain 5.3 Explain ageing for tenderness (7–21 d). 5.4 Describe prime cuts 5.5 Explain Nigerian retail nomenclature. 5.6 Explain value-addition 5.7 Explain skin Processing 5.8 Describe Nigerian premium markets 5.9 Explain traceability. 5.10 Outline regulatory compliance.	• Explain slaughter • Explain cold chain: chill to 4 °C within 24–48 h. • Explain ageing for tenderness (7–21 d). • Explain primal cuts: chuck, brisket, plate, ribs, loin, round. • Explain Nigerian retail nomenclature. • Explain value-addition • Explain skin Procesing • Explain Nigerian premium markets • Explain traceability: lot tracking, online QR codes, farm-	Textbook Projector Whiteboard Marker Journal Computer Internet	• Observe slaughter at abattoir/slaughter slab. • Apply prime cutting on a sample carcass. • Prepare a small batch of sausage, kilishi • Calculate premium pricing (60–150 % above conventional). • Visit a Nigerian premium retail outlet; • Document pricing. • Compose a value-chain plan for organic beef.	Guide students to: • Observe slaughter at abattoir. • Apply prime cutting on a sample carcass. • Prepare a small batch of sausage, kilishi • Calculate premium pricing (60–150 % above conventional). • Visit a Nigerian premium retail outlet • Document pricing. • Compose a value-chain plan for organic beef.	Abattoir. Carcass. Ingredients. Retail access. Plan template.

		visit days. • Discuss regulatory compliance.				

COURSE ASSESSMENT:

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

ORGANIC ANIMAL DISEASE PREVENTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC ANIMAL DISEASE PREVENTION	**COURSE CODE: OAP 423**	**CONTACT HOURS: 3HOURS/WEEK**
	CREDIT UNIT: 3	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE:**	**PRACTICAL: 2 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in disease prevention in organic animal production		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Know the prevention paradigm in organic animal health; 2.0 Know ethnoveterinary medicine and antimicrobial stewardship; 3.0 Know outbreak preparedness, response and One Health integration; 4.0 Know disease-prevention plan for a Nigerian organic enterprise.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC ANIMAL DISEASE PREVENTION	COURSE CODE: OAP 423	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE: OAP 411	PRACTICAL: 2 HOURS/WEEK
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL		
GOAL: This course is designed to equip students with knowledge and skills in disease prevention in organic animal production		
GENERAL OBJECTIVE 1.0: Know the prevention paradigm in organic animal health.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-4	1.1 Distinguish between prevention and treatment paradigm. 1.2 Outline the IFOAM Principle of Health. 1.3 Describe cascading in organic systems 1.4 Explain why prevention dominates in organic production 1.5 Distinguish between endemic, epidemic and sporadic diseases 1.6 Explain surveillance types 1.7 Describe the role of	• Distinguish between prevention and treatment paradigm. • State the IFOAM Principle of Health. • Explain cascading in organic systems: breed → nutrition → housing/environment → management → prevention → treatment and reporting • Explain why prevention dominates in organic production • Distinguish between	Whiteboard, projector. Reference textbooks IFOAM materials. Case studies.	• Compose a one-page summary of the organic prevention paradigm. • Compile a 30-term glossary of disease-prevention terminology. • Carry out animal handling in heat stress condition • Examine the One Health linkage of prevention. • Compile transboundary,	Guide students to: • Compose a one-page summary of the organic prevention paradigm. • Compile a 30-term glossary of disease-prevention terminology. • Carry out animal handling in heat stress condition • Examine the One Health linkage of prevention. • Compile transboundary, zoonotic, reportable diseases	Summary template. Glossary template. Case data. Discussion materials.

	stress reduction in disease prevention. 1.8 Outline the role of the organic-animal-health technologist in prevention. 1.9 Explain Bio-security to organic livestock enterprises 1.10 Explain Quarantine.	endemic, epidemic and sporadic diseases. • Explain surveillance types: active, passive, sentinel, syndromic. • State the role of stress reduction in disease prevention. • Explain the role of the organic-animal-health technologist in prevention. • Explain Bio-security to organic livestock enterprises. • Explain Quarantine		zoonotic, reportable diseases.		
GENERAL OBJECTIVE 2.0: Know ethnoveterinary medicine and antimicrobial stewardship						
5-8	2.1 Define ethnoveterinary medicine (EVM) and antimicrobial stewardship 2.2 Explain EVM as first-line treatment under organic standards and the negative impact of AMR globally 2.3 Outline major Nigerian medicinal plants 2.4 Explain herbal anthelmintics.	• Explain ethnoveterinary medicine (EVM) and antimicrobial stewardship • Explain EVM as first-line treatment under organic standards and the negative impact of AMR globally • Explain major Nigerian medicinal plants • Explain herbal anthelmintics: neem, pawpaw seeds, garlic, Tithonia, mango leaf.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify 15 Nigerian medicinal plants. • Prepare a neem-and-pawpaw anthelmintic decoction. • Prepare a garlic-honey wound salve. • Maintain an EVM treatment record. • Compose an EVM-first treatment protocol for an organic herd. • Apply dose calculation: typical 5–10 ml/kg of decoction.	• Identify 15 Nigerian medicinal plants. • Prepare a neem-and-pawpaw anthelmintic decoction. • Prepare a garlic-honey wound salve. • Maintain an EVM treatment record. • Compose an EVM-first treatment protocol for an organic herd. • Apply dose calculation: typical 5–10 mL/kg of decoction.	Plant samples. Preparation tools. Tools. Record book. Protocol template.

	2.5 Explain antimicrobials. 2.6 Describe wound treatment. 2.7 Explain prudent-use principles when antibiotics are unavoidable. 2.8 Describe withdrawal under organic standards	• Explain antimicrobials: neem, garlic, propolis, turmeric. • Explain wound treatment: aloe vera, honey, papain, neem oil. • Explain prudent-use principles when antibiotics are unavoidable: right drug, right dose, right duration, right indication. • Explain withdrawal under organic standards		• Apply prudent-use principles when antibiotics are unavoidable: right drug, right dose, right duration, right indication. • Apply alternatives: phytotherapy, vaccines ,prebiotics, probiotics, biosecurity	• Apply prudent-use principles when antibiotics are unavoidable: right drug, right dose, right duration, right indication. • Apply alternatives: phytotherapy, vaccines, probiotics, biosecurity	
GENERAL OBJECTIVE 3.0: Know outbreak preparedness, response and One Health integration.						
9-12	3.1 Describe outbreak preparedness. 3.2 Outline the role of NCDC, State DVS, CVON for zoonotic outbreaks 3.3 Describe communication strategy and risk communication.	• Discuss outbreak preparedness: contingency plan, training, simulation, supplies. • Discuss the role of NCDC, State DVS, CVON for zoonotic outbreaks • Explain communication strategy and risk communication.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct outbreak response steps to an organic-farm. • Conduct a simulated tabletop exercise. • Compose an outbreak response plan. • Conduct outbreak simulation exercise. • Profile Nigerian recent outbreaks.	Guide students to; • Conduct outbreak response steps to a hypothetical organic-farm. • Conduct a simulated tabletop exercise. • Compose an outbreak response plan. • Conduct outbreak simulation exercise. • Profile Nigerian recent outbreaks.	Scenario. Tabletop materials. Plan template. Outbreak data.

GENERAL OBJECTIVE 4.0: Know disease-prevention plan for a Nigerian organic enterprise.						
13-15	4.1 Explain integrated bio-security, herd-health, vaccination, phytotherapy, AMR, outbreak response. 4.2 Explain organic herd health. 4.3 Explain steps to conduct a disease-risk assessment.	• Explain integrated bio-security, herd-health, vaccination, phytotherapy, AMR, outbreak response. • Discuss organic herd health. • Explain steps to conduct a disease-risk assessment.	Plan template. Reference textbooks. Projector.	• Compose the capstone disease-prevention plan. • Deliver an oral defence. • Submit the capstone plan. • Sit the final integrated practical and written assessment.	Guide Students to: • Compose the capstone disease-prevention plan. • Deliver an oral defence. • Submit the capstone plan. • Sit the final integrated practical and written assessment.	Plan rubric. Defence venue. Submission portal. Assessment.
COURSE ASSESSMENT: Course work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% **Total: 100%**						

ORGANIC DAIRY CATTLE PRODUCTION

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC DAIRY CATTLE PRODUCTION	**COURSE CODE: OAP 424**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE: OAP 422, OAP 411**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to equip students with knowledge and skills in organic dairy-cattle production under Nigerian conditions.		
GENERAL OBJECTIVES: On completion of the course, the students should be able to: 1.0 Know dairy breeds suitable for organic systems in Nigeria; 2.0 Know pasture-based organic dairy systems; 3.0 Know reproductive management and Artificial Insemination (AI) in dairy herds; 4.0 Know transition cows, fresh cows and lactating cows; 5.0 Know hygienic milking and mastitis prevention; 6.0 Know replacement heifers and bull calves; 7.0 Know herd-health and welfare management; 8.0 Understand the economics of Nigeria premium organic dairy value chain.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY						
COURSE TITLE: ORGANIC DAIRY CATTLE PRODUCTION			COURSE CODE: OAP 424		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GENERAL OBJECTIVE 1.0: Know dairy breeds suitable for organic systems in Nigeria.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Describe Nigerian dairy-capable indigenous breeds for milking in pastoralist context. 1.2 Explain exotic dairy breeds. 1.3 Explain tropical breeds 1.4 Explain crossbreeding for tropics 1.5 Explain breed selection for organic milk production. 1.6 Explain the welfare disadvantage of high-producing breeds under organic stress. 1.7 Explain breeding programmes for	• Outline Nigerian dairy-capable indigenous breeds for milking in pastoralist context. • Explain exotic dairy breeds. • Explain tropical breeds • Explain crossbreeding for tropics • Explain breed selection for organic for organic milk production. • Explain the welfare disadvantage of high-producing	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify 5 dairy breeds from photos and live animals. • Score conformation on 5 dairy cows. • Profile NAPRI crossbreeding programme. • Compose a breed-selection guide for a Nigerian zone.	Guide students to: • Identify 5 dairy breeds from photos and live animals. • Score conformation on 5 dairy cows. • Profile NAPRI crossbreeding programme. • Compose a breed-selection guide for a Nigerian zone.	Photos, animals. Conformation chart. NAPRI data. Guide template.

	tropical dairy. 1.8 Explain performance parameters	breeds under organic stress. • Discuss NAPRI breeding programmes for tropical dairy. • Discuss performance parameters: milk yield, lactation length				
GENERAL OBJECTIVE 2.0: Know pasture-based organic dairy systems.						
3-4	2.1 Explain pasture-based dairy. 2.2 Explain rotational grazing for dairy cows 2.3 Explain organic-compliant housing. 2.4 Explain heat-stress mitigation 2.5 Describe Nigerian dairy housing examples. 2.6 Explain milking-parlour design 2.7 Describe waste management in organic dairy production	• Discuss pasture-based dairy. • Discuss rotational grazing for dairy cows • Explain organic-compliant housing. • Explain heat-stress mitigation • Explain Nigerian dairy housing examples. • Explain milking-parlour design • Discuss waste management.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Design a 50-cow dairy parlour and housing layout. • Apply rotational grazing for dairy cows • Calculate stocking for a chosen zone. • Visit a Nigerian organic dairy operation. • Apply silvopasture in dairy	Guide students to: • Design a 50-cow dairy parlour and housing layout. • Apply rotational grazing for dairy cows • Calculate stocking for a chosen zone. • Visit a Nigerian organic dairy operation. • Apply silvopasture in dairy	Plan paper. Calculator. Farm access. Design rubric.
GENERAL OBJECTIVE 3.0: Know reproductive management in dairy herds.						
5-6	3.1 Explain cattle reproductive	• Explain cattle reproductive	Textbook Projector	• Apply visual heat detection on a small	Guide students to: • Apply visual heat detection	Dairy herd. AI kit.

	parameters 3.2 Explain intensive heat detection 3.3 Explain oestrous synchronisation 3.4 Explain Assistant reproductive technique 3.5 Explain pregnancy diagnosis. 3.6 Explain genetic improvement. 3.7 Explain parturition management 3.8 Explain bull management	parameters • Explain intensive heat detection • Explain oestrous synchronisation • Explain AI and embryo transfer, synchronization: high frequency in commercial dairy. • Explain pregnancy diagnosis • Explain genetic improvement. • Explain parturition management: clean calving, dystocia recognition. • Explain bull management	Whiteboard Marker Journal Computer Internet	dairy herd. • Conduct AI on a dairy cow. • Conduct pregnancy diagnosis. • Manage transition cow (3 wk pre to 3 wk post calving) — critical period • Calculate reproductive KPIs from sample data. • Manage dry period: 60 d minimum; nutritional balance • Maintain a dairy breeding record book.	on a small dairy herd. • Conduct AI on a dairy cow. • Conduct pregnancy diagnosis. • Manage transition cow (3 wk pre to 3 wk post calving) — critical period • Calculate reproductive KPIs from sample data. • Manage dry period: 60 d minimum; nutritional balance • Maintain a dairy breeding record book.	Pregnant cow. Sample data. Record book.
GENERAL OBJECTIVE 4.0: Know transition cows, fresh cows and lactating cows.						
7-9	4.1 Explain transition cow (3 wk pre-calving to 3 wk post 4.2 Explain fresh cow (0–30 d 4.3 Explain early lactation 4.4 Explain BCS 4.5 Explain mid lactation (peak yield to 200 d).	• Explain transition cow (3 wk pre-calving to 3 wk post): nutritional balance, DCAD diet, energy density. • Explain fresh cow (0–30 d): high-priority monitoring for ketosis, milk	Textbook Projector Whiteboard Marker Journal Computer Internet	• Score BCS on 10 dairy cows. • Conduct NEFA/BHBA on a transition cow. • Compose a transition-cow management protocol. • Calculate lactation curve and persistency • Maintain a lactation	Guide students to: • Score BCS on 10 dairy cows. • Conduct NEFA/BHBA on a transition cow. • Compose a transition-cow management protocol. • Calculate lactation curve and persistency • Maintain a lactation record	Scale, chart. Test kit. Protocol template. Record book, live animal

	4.6 Explain late lactation (200 d to dry off). 4.7 Explain dry-off. 4.8 Explain milk-yield monitoring. 4.9 Explain NEFA/BHBA monitoring for transition disease. 4.10 Explain nutritional supplementation under organic standards.	fever, displaced abomasum, retained placenta, metritis. • Explain early lactation: peak yield (60–80 d post calving). • Explain BCS: target 3.0–3.5 at calving; 2.5–3.0 in early lactation. • Explain mid lactation (peak yield to 200 d). • Explain late lactation (200 d to dry off). • Explain dry-off: gradual reduction; teat seal application. • Explain milk-yield monitoring: daily, weekly, monthly. • Discuss NEFA/BHBA monitoring for transition disease. • Explain nutritional supplementation under organic standards.		record book.	book.	
GENERAL OBJECTIVE 5.0: Know hygienic milking and mastitis prevention.						
10-11	5.1 Explain pre-milking	• Explain pre-milking	Textbook	• Conduct hygienic	Guide students to:	Dairy cow.

	routine. 5.2 Explain milking machine attachment and removal. 5.3 Explain post-milking dip. 5.4 Explain teat-end health assessment. 5.5 Describe mastitis types. 5.6 Explain mastitis-prevention strategies under organic standards. 5.7 Explain phytotherapy. 5.8 Explain somatic-cell-count monitoring at quarter, cow and herd level.	routine: clean udder, individual cloth, pre-dip (iodine), strip-cup test, dry udder. • Explain milking machine attachment and removal. • Explain post-milking dip • Explain teat-end health assessment. • Explain mastitis types • Explain mastitis-prevention strategies under organic standards • Explain phytotherapy: garlic, propolis, herbal teat cream. • Explain somatic-cell-count monitoring at quarter, cow and herd level.	Projector Whiteboard Marker Journal Computer Internet	milking on a dairy cow. • Carryout Milking machine attachment and removal • Apply CMT on 4 quarters of 5 cows. • Maintain a milking SOP. • Calculate Bulk-Tank Somatic Cell Count (BTSCC): target < 200,000/ml; bonus quality < 150,000. • Compose a mastitis-prevention plan. • Conduct microbiology sampling and culture	• Conduct hygienic milking on a dairy cow. milking machine attachment and removal • Apply CMT on 4 quarters of 5 cows. • Maintain a milking SOP. • Calculate Bulk-Tank Somatic Cell Count (BTSCC): target < 200,000/mL; bonus quality < 150,000. • Compose a mastitis-prevention plan. • Conduct microbiology sampling and culture	CMT kit. SOP template. Plan template.
GENERAL OBJECTIVE 6.0: Know replacement heifers and bull calves.						
12-13	6.1 Explain organic-compliant calf-rearing 6.2 Explain weaning at 8–12 weeks (longer than conventional).	• Discuss organic-compliant calf-rearing: dam-rearing or bucket-rearing with whole milk; no milk replacer (some	Textbook Projector Whiteboard Marker Journal Computer	• Care for a newborn dairy calf. • Measure colostrum quality. • Manage breeding heifer: target service at 15	Guide students to: • Care for a newborn dairy calf. • Measure colostrum quality. • Manage breeding heifer: target service at 15 months,	Calves. Colostrometer. Calf housing. Calculator.

	6.3 Explain post-weaning growth. 6.4 Describe organic-compliant veal production (where market exists).	organic standards prohibit). • Explain weaning at 8–12 weeks (longer than conventional). • Explain post-weaning growth: 0.7–0.9 kg/d ADG. • Explain organic-compliant veal production (where market exists).	Internet	months, calving at 24 months. • Calculate heifer-rearing economics. • Manage bull calves • Manage a small group of calves for one month. • Apply weighing and BCS throughout rearing. • Calculate heifer-rearing cost.	calving at 24 months. • Calculate heifer-rearing economics. • Manage bull calves • Manage a small group of calves for one month. • Apply weighing and BCS throughout rearing. • Calculate heifer-rearing cost.	
GENERAL OBJECTIVE 7.0: Know herd-health and welfare management.						
14-15	7.1 Explain bio-security for dairy. 7.2 Explain vaccination 7.3 Explain parasite management. 7.4 Explain tick-borne disease, mange, trypanosomiasis. 7.5 Explain lameness. 7.6 Explain heat-stress management. 7.7 Explain welfare assessment 7.8 Explain zoonoses. 7.9 Explain One Health linkages.	• Explain bio-security for dairy. • Explain vaccination • Discuss parasite management: rotational grazing, strategic deworming. • Explain tick-borne disease, mange trypanosomiasis. • Explain lameness: hoof trimming, footbaths, dry walking surfaces, free-stall design. • Explain heat-stress management: shade,	Textbook Projector Whiteboard Marker Journal Computer Internet	• Carry out hoof trimming on a dairy cow. • Score locomotion on 10 cows. • Apply RBPT on dairy serum samples. • Carry out parasite management: rotational grazing, strategic deworming • Carry out lameness prevention: hoof trimming, footbaths, dry walking surfaces, free-stall design • Conduct heat-stress management: shade, water, fans/sprinklers,	Guide students to: • Apply hoof trimming on a dairy cow. • Score locomotion on 10 cows. • Apply RBPT on dairy serum samples. • Apply parasite management: rotational grazing, strategic deworming • Apply lameness prevention: hoof trimming, footbaths, dry walking surfaces, free-stall design • Apply heat-stress management: shade, water, fans/sprinklers, evening	Hoof tools. Score chart. RBPT kit. Plan template.

		water, fans/sprinklers, evening grazing. • Explain welfare assessment: locomotion score, hock score, BCS, behavioural. • Explain zoonoses: • Discuss One Health linkages.		evening grazing. • Apply welfare assessment: locomotion score, hock score, BCS, behavioural. • Maintain herd-health records. • Compose a herd-health plan for a 50-cow organic dairy.	grazing. • Apply welfare assessment: locomotion score, hock score, BCS, behavioural. • Maintain herd-health records. • Compose a herd-health plan for a 50-cow organic dairy.	

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

CLIMATE SUSTAINABILITY AND ETHICS

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: CLIMATE SUSTAINABILITY AND ETHICS	**COURSE CODE: OAP 425**	**CONTACT HOURS: 4 HOURS/WEEK**
	CREDIT UNIT: 4	**THEORETICAL: 1 HOUR/WEEK**
YEAR: II SEMESTER: II	**PRE-REQUISITE: NIL**	**PRACTICAL: 3 HOURS/WEEK**
GOAL: This course is designed to quip students with knowledge and skills in climate sustainability and ethics		
GENERAL OBJECTIVES: On completion of the course, the students should be able to: 1.0 Understand the IFOAM four principles as an ethical framework; 2.0 Know veterinary and animal-welfare ethics; 3.0 Understand environmental ethics and biodiversity protection; 4.0 Know organic-livestock practice with the UN Sustainable Development Goals; 5.0 Know ESG (Environmental, Social, Governance) principles; 6.0 Know climate justice, CBDR, Paris Agreement and NDC; 7.0 Know professional ethics and code of conduct; 8.0 Know Environmental Social Impact Assessment (ESIA) on an organic-livestock project; 9.0 Know integrated ethics		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY						
COURSE TITLE: CLIMATE SUSTAINABILITY AND ETHICS			COURSE CODE: OAP 425		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE: NIL		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to quip students with knowledge and skills in climate sustainability and ethics						
GENERAL OBJECTIVE 1.0: Understand the IFOAM four principles as an ethical framework.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1	1.1 Outline the four IFOAM principle 1.2 Explain the Principle of Health 1.3 Explain the Principle of Ecology 1.4 Explain the Principle of Fairness 1.5 Explain the Principle of Care. 1.6 Explain how IFOAM principles translate into NOAN, EU and USDA NOP standards	• Discuss the four IFOAM principle; Health, Ecology, Fairness, Care and their role in food sovereignty • Explain the Principle of Health • Explain the Principle of Ecology • Explain the Principle of Fairness • Discuss the Principle of Care: organic livestock should be managed in a precautionary and	Textbook Projector Whiteboard Marker Journal Computer Internet	• Apply IFOAM principles to a chosen Nigerian organic farm.	Guide students to: • Apply IFOAM principles to a chosen Nigerian organic farm.	Essay template. Farm scenario. Discussion materials.

		responsible manner to protect health and well-being of current and future generations. • Explain how IFOAM principles translate into NOAN, EU and USDA NOP standards				
GENERAL OBJECTIVE 2.0: Know veterinary and animal-welfare ethics.						
2-3	2.1 Explain animal welfare 2.2 Outline the 5 Freedoms (FAWC) 2.3 Explain the more recent 5 Domains (Mellor) 2.4 Explain sentience and ethical implications. 2.5 Explain welfare assessment.	• Explain animal welfare; • State the 5 Freedoms (FAWC): freedom from hunger/thirst, discomfort, pain/injury/disease, fear/distress, freedom to express normal behaviour. • Explain the more recent 5 Domains (Mellor): nutrition, environment, health, behaviour, mental state. • Explain sentience and ethical implications. • Explain welfare assessment: visual	Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct a welfare audit on the institution farm using 5 Domains framework.	Guide students to: • Conduct a welfare audit on the institution farm using 5 Domains framework.	Audit checklist. Case studies. Discussion materials.

		scoring (BCS, locomotion, hock, neck, hair coat), behavioural, physiological.				
GENERAL OBJECTIVE 3.0: Understand environmental ethics and biodiversity protection.						
4	3.1 Define environmental ethics. 3.2 Explain anthropocentric, biocentric, ecocentric and deep-ecology positions. 3.3 Explain the precautionary principle. 3.4 Explain bio-diversity as a key indicator of organic farm health. 3.5 Outline Nigerian bio-diversity 3.6 Explain NESREA bio-diversity regulations. 3.7 Explain CBD (Convention on Biological Diversity) and Nagoya Protocol. 3.8 Explain the role of organic livestock in biodiversity conservation.	• Explain environmental ethics. • Explain anthropocentric, biocentric, ecocentric and deep-ecology positions. • Explain the precautionary principle. • Explain bio-diversity as a key indicator of organic farm health. • Discuss Nigerian bio-diversity: ecological zones, endemic species, threatened species • Explain NESREA bio-diversity regulations. • Explain CBD (Convention on Biological Diversity) and Nagoya Protocol. • Explain the role of	Environmental ethics references. Textbook Projector Whiteboard Marker Journal Computer Internet	•Profile 5 Nigerian endangered species. •Compose a bio-diversity-enhancement plan for an organic farm. •Examine the role of native breeds in agro-bio-diversity.	Guide students to: •Profile 5 Nigerian endangered species. •Compose a bio-diversity-enhancement plan for an organic farm. •Examine the role of native breeds in agro-bio-diversity.	Species profiles. Plan template. Discussion materials. Breed data.

	3.9 Describe the role of NCF, FME, NACGRAB and NAPRI in agro-bio-diversity conservation. 3.10 Explain trade-offs	organic livestock in bio-diversity conservation. • Discuss the role of NCF, FME, NACGRAB and NAPRI in agro-bio-diversity conservation. • Discuss trade-offs: production and conservation in livestock systems.				
GENERAL OBJECTIVE 4.0: Know organic-livestock practice with the UN Sustainable Development Goals.						
5-6	4.1 Outline the 17 SDGs adopted in 2015 with 2030 target. 4.2 Explain the following SDGs i. SDG 2 ii. SDG 3 iii. SDG 5 iv. SDG 6 v. SDG 8 vi. SDG 12 vii. SDG 13 viii. SDG 14, 15 ix. SDG 1 and 10. x. SDG 16. 4.3 Explain SDG-alignment to a chosen Nigerian organic-	• Discuss the 17 SDGs adopted in 2015 with 2030 target. • Explain SDG 2: Zero Hunger — organic-livestock contribution. • Explain SDG 3: Good Health and Wellbeing — reduced antibiotic use, reduced zoonotic spillover. • Explain SDG 5: Gender Equality — women in organic livestock. • Explain SDG 6: Clean Water — reduced	SDG documents. Reference textbooks. Projector.	• Apply SDG-alignment to a chosen Nigerian organic-livestock project. • Compose an SDG-impact report for a organic enterprise. • Identify which 5 SDGs are most relevant to a chosen project.	Guide students to: • Apply SDG-alignment to a chosen Nigerian organic-livestock project. • Compose an SDG-impact report for a organic enterprise. • Identify which 5 SDGs are most relevant to a chosen project. .	SDG framework. Report template. Project scenario. Discussion materials.

	livestock project.	agricultural runoff. • Explain SDG 8: Decent Work — fair labour, premium incomes. • Explain SDG 12: Responsible Consumption and Production — circular economy. • Explain SDG 13: Climate Action — climate-smart organic livestock. • Explain SDG 14, 15: Life below water and on land — bio-diversity, soil health. • Explain SDG 1, 10: Poverty and inequality — smallholder benefit. • Explain SDG 16: Peace, justice — farmer-herder conflict mitigation (NL-GA). • Explain SDG-alignment to a chosen Nigerian organic-livestock project.				
GENERAL OBJECTIVE 5.0: Know ESG (Environmental, Social, Governance) principles.						
7-8	5.1 Define ESG.	• Explain ESG.	ESG	• Apply ESG	Guide students to:	Framework

	5.2 Explain Environmental component. 5.3 Explain Social component. 5.4 Explain Governance component. 5.5 Explain ESG as growing investment criterion. 5.6 Describe ESG reporting frameworks. 5.7 Explain ESG to a Nigerian organic-livestock business. 5.8 Explain carbon-credit and ESG-linked finance opportunities. 5.9 Explain ESG metrics for organic certification audit. 5.10 Describe the role of investors and consumers in driving ESG. 5.11 Explain Nigerian SEC/Stock Exchange ESG requirements	• Explain Environmental component: emissions, water, waste, biodiversity. • Explain Social component: labour, community, gender, indigenous rights. • Explain Governance component: ethics, transparency, accountability, anti-corruption. • Explain ESG as growing investment criterion. • Discuss ESG reporting frameworks • Explain ESG to a Nigerian organic-livestock business. • Explain carbon-credit and ESG-linked finance opportunities. • Explain ESG metrics for organic certification audit. • Discuss the role of investors and consumers in driving ESG. • Explain Nigerian	references. GRI standards. Textbook Projector Whiteboard Marker Journal Computer Internet.	framework to a chosen Nigerian organic-livestock enterprise. • Compose an ESG report for an organisation. • Profile 3 Nigerian companies' ESG reports.	• Apply ESG framework to a chosen Nigerian organic-livestock enterprise. • Compose an ESG report for a hypothetical organisation. • Profile 3 Nigerian companies' ESG reports.	template. Report template. Company reports. Discussion materials.

		SEC/Stock Exchange ESG requirements (emerging).				
GENERAL OBJECTIVE 6.0: Know climate justice, CBDR and the Paris Agreement and NDC						
9-10	6.1 Explain Common but Differentiated Responsibilities (CBDR) under UNFCCC. 6.2 Outline the Paris Agreement (2015) and the 1.5 °C / 2 °C target. 6.3 Explain Nationally Determined Contributions (NDC). 6.4 Explain Monitoring, Reporting and Verification (MRV) system 6.5 Explain the role of organic agriculture in mitigation and adaptation. 6.6 Explain climate-finance 6.7 Explain Loss and Damage Fund (COP27).	•Explain Common but Differentiated Responsibilities (CBDR) under UNFCCC. •Discuss the Paris Agreement (2015) and the 1.5 °C / 2 °C target. •Explain Nationally Determined Contributions (NDC). •Explain Nigerian NDC: mitigation, adaptation, finance components; livestock sector role. •Explain the role of organic agriculture in mitigation and adaptation. •Explain climate-finance: Green Climate Fund, Adaptation Fund, GCF. •Explain Loss and Damage Fund (COP27).	Textbook Projector Whiteboard Marker Journal Computer Internet	• Profile Nigerian NDC and identify livestock-related commitments. • Compose a climate-justice case study from Nigerian context. • Apply climate-finance principles to an organic project.	Guide students to: • Profile Nigerian NDC and identify livestock-related commitments. • Compose a climate-justice case study from Nigerian context. • Apply climate-finance principles to an organic project.	NDC document. Case template. Finance materials.

GENERAL OBJECTIVE 7.0: Know professional ethics and code of conduct.						
11	7.1 Outline professional ethics. 7.2 Explain VCN code of professional conduct. 7.3 Explain NIAS (Nigerian Institute of Animal Science) code. 7.4 Explain confidentiality of client and farm data. 7.5 Explain conflict of interest disclosure and management. 7.6 Explain whistleblowing principles (in case of fraud, animal abuse, regulatory non-compliance). 7.7 Explain scientific integrity 7.8 Explain ethical research conduct 7.9 Explain the role of ethical review boards for animal research. 7.10 Explain professional ethics to certification audits. 7.11 Describe ethics in extension and farmer relationships.	•Outline professional ethics: integrity, honesty, competence, confidentiality, respect, accountability. •Explain VCN code of professional conduct. •Explain NIAS (Nigerian Institute of Animal Science) code. •Explain confidentiality of client and farm data. •Explain conflict of interest disclosure and management. •Explain whistleblowing principles (in case of fraud, animal abuse, regulatory non-compliance). •Explain scientific integrity: data accuracy, no fabrication, no plagiarism. •Explain ethical research conduct •Explain the role of ethical review boards for animal research. •Explain professional ethics to certification	Textbook Projector Whiteboard Marker Journal Computer Internet	• Profile VCN and NIAS code of conduct • Compose a personal professional ethics statement.	Guide students to: • Profile VCN and NIAS code of conduct • Compose a personal professional ethics statement.	Codes. Statement template. Discussion materials.

		audits. •Discuss ethics in extension and farmer relationships.				
GENERAL OBJECTIVE 8.0: Know Environmental Social Impact Assessment (ESIA) on an organic-livestock project.						
12-13	8.1 Define ESIA and its purpose. 8.2 Explain Nigerian EIA Act 1992 and NESREA requirements. 8.3 Explain ESIA steps 8.4 Explain screening to determine if an organic-livestock project requires ESIA. 8.5 Explain stakeholder consultation. 8.6 Explain impacts. 8.7 Explain mitigation hierarchy. 8.8 Explain post-ESIA monitoring.	• Explain ESIA and its purpose. • Explain Nigerian EIA Act 1992 and NESREA requirements. • Explain ESIA steps: screening, scoping, baseline study, impact identification, prediction, mitigation, monitoring. • Explain screening to determine if an organic-Conduct mini-EIA. • Explain screening to determine if an organic-livestock project requires ESIA. • Explain stakeholder consultation. • Explain impacts: air, water, soil, noise, biodiversity, social, economic, health. • Explain mitigation hierarchy: avoid,	ESIA Act. NESREA documents. Textbook Projector Whiteboard Marker Journal Computer Internet	• Conduct a mini-ESIA on a chosen organic-livestock project. • Compose an Environmental Management Plan. • Apply stakeholder consultation in a simulation. • Conduct a mini-ESIA on a chosen organic-livestock project. • Submit a mini-ESIA report.	Guide students to: • Conduct a mini-ESIA on a chosen organic-livestock project. • Compose an Environmental Management Plan. • Apply stakeholder consultation in a simulation. • Conduct a mini-ESIA on a chosen organic-livestock project. • Submit a mini-ESIA report.	Project scenario. EMP template. Stakeholders. Report rubric.

		minimize, restore and offset. • Explain post-ESIA monitoring.				

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

ORGANIC HIDES, SKIN AND LEATHER PROCESSING

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: ORGANIC HIDES, SKIN AND LEATHER PROCESSING	**COURSE CODE: OAP 426**	**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 the students with knowledge and skills in production, handling and processing of hides and skins from organic livestock		
GENERAL OBJECTIVES: On completion of the course, the students should be able to: 1.0 Understand the biology and structure of hides and skin; 2.0 Know Nigerian and global leather industry; 3.0 Understand correct pre- and post-slaughter handling to maximise hides/skins quality; 4.0 Understand hides and skins by salting, drying and chilled storage; 5.0 Understand hides/skins defects and apply grading; 6.0 Know chrome tanning from vegetable (organic) tanning principles; 7.0 Know vegetable tanning using Nigerian tanning sources; 8.0 Know the regulatory and environmental framework for organic leather; 9.0 Understand the value-addition and premium organic-leather opportunities in Nigerian and AfCFTA markets.		

PROGRAMME: HIGHER NATIONAL DIPLOMA (HND) IN ORGANIC ANIMAL PRODUCTION TECHNOLOGY		
COURSE TITLE: HIDES, SKIN AND ORGANIC LEATHER PROCESSING	COURSE CODE: OAP 426	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 the students with knowledge and skills in production, handling and processing of hides and skins from organic livestock		
GENERAL OBJECTIVE 1.0: Comprehend the biology and structure of hides and skins.		

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
1-2	1.1 Explain the differences between hides (cattle, buffalo) and skins (sheep, goat, calf). 1.2 Describe the three layers 1.3 Describe the corium (dermis) as the primary leather-forming layer of collagen fibres. 1.4 Describe structural elements 1.5 Outline the contribution of	• Explain the differences between hides (cattle, buffalo) and skins (sheep, goat, calf). • Outline the three layers: epidermis (5 %), dermis (papillary and reticular, 85–90 %), hypodermis (subcutaneous fat). • Discuss the corium (dermis) as the primary leather-forming layer of collagen fibres. • Discuss structural elements: hair follicles,	Textbook Projector Whiteboard Marker Journal Computer Internet	• Examine cross-sections of cattle hide and goat skin under low-power microscope. • Identify the three layers on a fresh hide sample. • Compare hide quality between Sokoto Red, Yankasa and WAD goat skins (samples or photos). • Compose a table on factors affecting hide quality.	Guide students to: • Examine cross-sections of cattle hide and goat skin under low-power microscope. • Identify the three layers on a fresh hide sample. • Compare hide quality between Sokoto Red, Yankasa and WAD goat skins (samples or photos). • Compose a table on factors affecting hide quality. Trace the chemistry of	Hide samples. Microscope. Skin samples. Table template.

	breed to hide quality 1.6 Explain factors affecting structure	sweat and sebaceous glands, blood vessels, nerves. • Outline the contribution of breed to hide quality • Explain factors affecting structure: age, sex, breed, nutrition, climate, parasites etc.		• Trace the chemistry of collagen and its conversion to leather.	collagen and its conversion to leather.	
GENERAL OBJECTIVE 2.0: Know Nigerian and global leather industry						
3	2.1 Describe the global leather industry 2.2 Explain Nigeria as leather producer in Africa. 2.3 Explain Nigerian leather history. 2.4 Describe Sokoto Red goat as producer of premium leather 2.5 Explain the Nigerian leather value chain craftsmen. 2.6 Outline major Nigerian leather companies and clusters 2.7 Outline AfCFTA implications for Nigerian leather	• Outline the global leather industry: ~24 billion sq ft annually; major producers China, Italy, Brazil, Nigeria. • Explain Nigeria as leather producer in Africa. • Discuss Nigerian leather history: Kano and Sokoto have been leather centres since medieval times. • Discuss Sokoto Red goat as producer of premium leather sought by Italian luxury brands. • Explain the Nigerian leather value chain:	Industry reports. NEPC publications. Textbook Projector Whiteboard Marker Journal Computer Internet	• Visit tannery; • Document operations. • Profile 3 Nigerian leather companies. • Map the Nigerian leather value chain. • Identify NEPC leather export data over the last 5 years. • Examine traditional tanning	Guide students to: • Visit a Kano or Aba tannery • Document operations. • Profile 3 Nigerian leather companies. • Map the Nigerian leather value chain. • Identify NEPC leather export data over the last 5 years. • Examine traditional Hausa tanning (Tanneries of Kano: "Moroccan" leather is largely Nigerian).	Tannery access/video. Company materials. Value-chain template. NEPC data.

	under intra-African trade. 2.8 Explain the role of Nigerian Export Promotion Council (NEPC), National Institute for Leather and Science Technology (NILEST), FMLD	producers, traders, tanneries, exporters/finishers and craftsmen. • Discuss major Nigerian leather companies and clusters • Outline AfCFTA implications for Nigerian leather under intra-African trade. • Discuss Nigerian Export Promotion Council (NEPC) role in leather export promotion. • Discuss the under-utilisation of organic livestock hide and skin in leather production				
GENERAL OBJECTIVE 3.0: Understand correct pre- and post-slaughter handling to maximise hides/skin quality.						
4-5	3.1 Explain pre-slaughter rest. 3.2 Describe common flaying defects 3.3 Describe the time-sensitivity of curing (start within 6 h ideally).	• Explain pre-slaughter rest: 24 h water-only fasting reduces blood-related stains. • Discuss common flaying defects: scoring, grain damage, holes. • Discuss the time-sensitivity of curing (start within 6 h	Textbook Projector Whiteboard Marker Journal Computer Internet	• Apply correct flaying technique. • Use mechanical or hydraulic puller where available. • Remove flesh, fat and connective tissue (de-fleshing) within 24 h. • Apply trimming to remove low-value	Guide students to: • Apply correct flaying technique: minimise knife cuts (every cut reduces grade) • Use mechanical or hydraulic puller where available. • Remove flesh, fat and connective tissue (de-	Abattoir access. Calipers, Scale. Trimming tools. SOP template. Log book. Mechanical/puller hydrolic.

		ideally).		edges. • Measure hides area, weight and thickness. • Maintain abattoir hygiene to prevent microbial damage. • Apply traceability • Each hide/skin labelled with batch, date, animal source for organic certification.	fleshing) within 24 h. • Apply trimming to remove low-value edges. • Measure hide area, weight and thickness. • Maintain abattoir hygiene to prevent microbial damage. • Apply traceability: each hide/skin labelled with batch, date, animal source for organic certification.	
GENERAL OBJECTIVE 4.0: Understand hides and skins preservation by salting, drying and chilled storage.						
6	4.1 Explain goal of preservation 4.2 Explain salting. 4.3 Explain brining. 4.4 Explain dry-salting. 4.5 Explain drying. 4.6 Explain chilled storage. 4.7 Describe the moisture-content target after curing. 4.8 Explain defects. 4.9 Explain organic preservation. 4.10 Describe Storage 4.11 Explain traceability.	• Explain goal of preservation • Explain salting. • Explain brining. • Explain dry-salting. • Explain drying. • Explain chilled storage. • Discuss the moisture-content target after curing. • Explain defects. • Explain organic preservation. • Discuss Storage. • Explain traceability.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Carry out salting (wet-salting) • Carry out brining • Carry out dry-salting • Carry out suspension/air drying • Carry out chilled storage • Apply pesticide-free preservation under organic standards • Store cured hides correctly: dry, ventilated, pest-free. • Conduct traceability throughout preservation.	Guide students to; • Carry out salting (wet-salting) • Carry out brining • Carry out dry-salting • Carry out suspension/air drying • Carry out chilled storage • Apply pesticide-free preservation under organic standards • Store cured hides correctly: dry, ventilated, pest-free. • Conduct traceability throughout preservation.	Salt, hides. Drying racks. Sample hides. Moisture meter. SOP template.

GENERAL OBJECTIVE 5.0: Understand hide/skins defects and apply grading.						
7	5.1 Describe defects by origin: pre-mortem (ante-mortem) and post-mortem. 5.2 Explain pre-mortem defects 5.3 Describe post-mortem defects 5.4 Explain the economic impact of defects on Nigerian leather industry.	• Explain defects by origin: pre-mortem (ante-mortem) and post-mortem. • Explain pre-mortem defects: brand marks, scratches, tick damage, fungal infection (ringworm), mange, abscesses, parasitic nodules (e.g. warble fly), scars, wire damage, dung tag. • Discuss post-mortem defects: flay cuts, grain damage, putrefaction, salt stain, beetle damage, mould. • Discuss the economic impact of defects on Nigerian leather industry.	Textbook Projector Whiteboard Marker Journal Computer Internet	• Identify defects on 10 sample hides. • Grade 10 hides using MERZ hand grading • Calculate the value loss from defects on 5 hides. • Apply grading on flesh and grain sides. • Conduct moisture, salt and microbial spot tests. • Maintain a grading log	Guide students to: • Identify defects on 10 sample hides. • Grade 10 hides using MERZ hand grading • Calculate the value loss from defects on 5 hides. • Apply grading on flesh and grain sides. • Conduct moisture, salt and microbial spot tests. • Maintain a grading log	Hide samples. Grading kit. Calculator. Spot test kit. Log book.
GENERAL OBJECTIVE 6.0: Know chrome tanning from vegetable (organic) tanning principles.						
8-9	6.1 Describe the tanning process 6.2 Describe chrome tanning 6.3 Identify vegetable tanning 6.4 Distinguish other tannages	• Discuss the tanning process: stabilising collagen against microbial degradation and water uptake. • Discuss chrome tanning: basic	Textbook Projector Whiteboard Marker Journal Computer Internet	• Compare chrome-tanned and vegetable-tanned leather samples; • Identify visual and tactile differences. • Identify tannin	Guide students to: • Compare chrome-tanned and vegetable-tanned leather samples • Identify visual and tactile differences. • Identify tannin sources	Leather samples. Tannin sources. Table template. Research access.

	6.5 Describe vegetable tanning as the organic-compliant option. 6.6 Explain the recent global "eco-leather" and "leather working group" (LWG) market shift toward sustainable tanning. 6.7 Explain the chemistry of tannin-collagen binding. 6.8 Outline global leather industries	chromium sulphate; fast (1 day); produces wet-blue leather; durable but environmentally controversial. • Explain vegetable tanning: plant tannins (Acacia, mimosa, quebracho, chestnut, mangrove, sumac); slow (weeks to months); produces firmer, biodegradable leather. • Distinguish other tannages: aldehyde (formaldehyde), oil (chamois), alum (rare). • Explain vegetable tanning as the organic-compliant option. • Discuss the recent global "eco-leather" and "leather working group" (LWG) market shift toward sustainable tanning. • Discuss the chemistry of tannin-collagen binding. • Discuss global leather industries.		sources from local plant samples. • Compose a comparative table of tanning processes. • Investigate LWG-certified leather companies.	from local plant samples. • Compose a comparative table of tanning processes. • Investigate LWG-certified leather companies.	

GENERAL OBJECTIVE 7.0: Know tanning using Nigerian vegetable tanning types						
10-11	7.1 Explain Nigerian tanning materials 7.2 Highlight the traditional tanning process: 7.3 Explain safety considerations	• Explain Nigerian tanning materials • Outline the traditional tanning process: • Explain safety considerations: gloves, ventilation, eye protection.	Whiteboard, Lecture notes Reference textbooks. Projector.	• Identify 5 Nigerian tanning plant sources from samples. • Use natural dyes (organic-compliant): indigo, henna, kola • Conduct a complete miniature tanning process on a small goat skin (or sample) over the course of weeks • Prepare an Acacia or mangrove tanning extract • Soak in tanning solutions, scrape, repeat • Soak hide: rehydration, liming (to swell), bating (enzyme softening), de-liming. • Perform pickling (acidify in salt/acid solution). • Apply the tanning bath: progressively stronger tannin solutions (5 %, then 15 %, then 30 %); 2–6 weeks total. • Wring, set out and	• Guide students to: • Identify 5 Nigerian tanning plant sources from samples. • Use natural dyes (organic-compliant): indigo, henna, kola • Conduct a complete miniature tanning process on a small goat skin (or sample) over the course of weeks • Prepare an Acacia or mangrove tanning extract • soak in tanning solutions, scrape, repeat • Soak and prepare hide: rehydration, liming (to swell), bating (enzyme softening), de-liming. • Perform pickling (acidify in salt/acid solution). • Apply the tanning bath: progressively stronger tannin solutions (5 %, then 15 %, then 30 %); 2–6 weeks total. • Wring, set out and split hide.	Tanning plants. Bark extraction kit. Sample skin, tanning materials. Natural dyes. SOP template.

				split hide. • Apply re-tannage, fat-liquoring, dyeing. • Apply finishing • Apply natural-dye finishing. • Compose a tannery SOP for organic vegetable tanning.	• Apply re-tannage, fat-liquoring, dyeing. • Apply finishing • Apply natural-dye finishing. • Compose a tannery SOP for organic vegetable tanning.	
GENERAL OBJECTIVE 8.0: Know the environmental framework for organic leather (NESREA, SON, NEPC, LWG).						
12-13	8.1 Explain National Environmental Standards and Regulations Enforcement Agency (NESREA) regulation of tannery effluent. 8.2 Explain Standard Organization of Nigeria (SON) product-standards for Nigerian leather 8.3 Describe NEPC role in leather export. 8.4 Outline Leather Working Group (LWG) certification 8.5 Explain ISO 14001 (environmental management) and ISO 14064 (carbon).	• Discuss National Environmental Standards and Regulations Enforcement Agency (NESREA) regulation of tannery effluent. • Discuss SON product-standards for Nigerian leather and • Explain NEPC role in leather export. • Outline Leather Working Group (LWG) certification: gold, silver, bronze ratings. • Explain ISO 14001 (environmental management) and ISO 14064 (carbon). • Outline LCA (life-	Regulatory documents. LWG Textbook Projector Whiteboard Marker Journal Computer Internet	• Profile NESREA tannery regulations. • Identify LWG-certified African tanneries. • Compose a compliance checklist for an organic leather producer. • Investigate Nigerian leather labelling and certification practice.	• Guide students to: • Profile NESREA tannery regulations. • Identify LWG-certified African tanneries. • Compose a compliance checklist for an organic leather producer. • Investigate Nigerian leather labelling and certification practice.	NESREA documents. LWG database. Checklist template. Research access.

	8.6 Outline LCA (life-cycle analysis) for organic vs conventional leather. 8.7 Explain water-use and energy-use considerations. 8.8 Outline carbon-credit potential for organic leather. 8.9 Explain Explain Nigerian leather labelling requirements. 8.10 Explain the role of consumer awareness in premium leather markets.	cycle analysis) for organic vs conventional leather. • Discuss water-use and energy-use considerations. • Explain carbon-credit potential for organic leather. • Discuss Nigerian leather labelling requirements. • Discuss the role of consumer awareness in premium leather markets.				
GENERAL OBJECTIVE 9.0: Understand value-addition and premium organic-leather opportunities in Nigerian and AfCFTA markets.						
14-15	9.1 Explain finished leather products 9.2 Explain premium markets 9.3 Explain organic-leather branding and traceability. 9.4 State the challenges: water/energy access, regulatory burden, market access.	• Explain finished leather products: bags, shoes, belts, wallets, jackets, upholstery. • Explain premium markets: luxury fashion brands (especially Italian; importing Sokoto Red skins for centuries), domestic premium,	Textbook Projector Whiteboard Marker Journal Computer Internet.	• Examine Nigerian leather-craft clusters: Aba shoes, Kano goods, Sokoto saddlery. • Calculate ROI for an organic vegetable-tannery startup. • Compose the capstone organic leather business plan.	Guide students to: • Examine Nigerian leather-craft clusters: Aba shoes, Kano goods, Sokoto saddlery. • Calculate ROI for an organic vegetable-tannery startup. • Compose the capstone organic leather business plan.	Cluster data. Plan rubric. Submission. Assessment.

	9.5 Explain Nigerian government incentives.	AfCFTA, online direct-to-consumer. • Explain organic-leather branding and traceability. • Enumerate the challenges: water/energy access, regulatory burden, market access. • Explain Nigerian government incentives: NEPC, BOI, CBN intervention.		• Submit the capstone plan	• Submit the capstone plan.	

COURSE ASSESSMENT:

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

LIST OF MINIMUM RESOURCES/PHYSICAL FACILTIIES

A. COMPUTER LABORATORY

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Laptops	60
2.	Projector	10
3.	Solar system	5
4.	Internet	6
5.	Printers	10
6.	Scanners	6
7.	Stabilizers	9
8.	Fan	10
9.	Split Unit Air Conditioner	7
10.	Work station	4
11.	Screen board	11
12.	Memory cards	60
13.	Flash drives	100
14.	Word processing software	26
15.	Calculators	120
16.	Graphsheets	170
17.	Clipboard	30
18.	Whiteboard/Marker	50
19.	Labcoat	100
20.	Public Address system	6
21.	Desktops (Keyboard, mouse, monitor, CPU)	100
22.	Spreadsheet software	

B. WASTE MANAGEMENT AND BIOSECURITY LABORATORY EQUIPMENT

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Waste bins	10
2.	Incinerators	11
3.	Composting units	10
4.	Manure handling systems	10
5.	Biogas digesters	8
6.	Effluent disposal systems	7
7.	Foot dips	9
8.	Hand washing stations	7
9.	Disinfection tunnels	7
10.	Protective overalls	100
11.	Gloves and boots	100
12.	Face masks and shields	100
13.	Quarantine pens	70
14.	Carcass disposal units	20

C. ANIMAL FARM MECHANIZATION EQUIPMENT LABORATORY

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Multi-purpose tractors	6
2.	Tractor implements	6
3.	Disc ploughs	6
4.	Harrows	6
5.	Ridgers	6
6.	Seed drills	6
7.	Trailers	6
8.	Front-end loaders	6
9.	Forage harvesters	4
10.	Hammer mills	10
11.	Feed grinders	11
12.	Feed mixers	12
13.	Disc mowers	12
14.	Balers	5

15.	Chaff cutters	7
16.	Silage making machines	5
17.	Hay balers	4
18.	Hay rakes	7
19.	Fodder choppers	7
20.	Manure spreaders	7
21.	Water bowsers	7
22.	Power tillers	7
23.	Generator-powered sprayers	6
24.	GPS-guided machinery	5
25.	Farm drones for monitoring	5

D. FEED MILL

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Feed milling machines	5
2.	Pelletizers	5
3.	Feed formulation software	5
4.	Precision feed formulation systems	6
5.	Feed ingredient storage bins	7
6.	Feed weighing balances	11
7.	Moisture analyzers	11
8.	Laboratory weighing balances	11
9.	Feed grinders	11
10.	Feed mixers	11

E. NUTRITION LABORATORY EQUIPMENT

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Kjeldahl digestion apparatus	12
2.	Kjeldahl distillation unit	5
3.	Soxhlet extraction apparatus	10
4.	Muffle furnace	5
5.	Hot air oven	5
6.	Bomb calorimeter	7

7.	Spectrophotometer	7
8.	pH meter	7
9.	Centrifuge	7
10.	Water bath	7
11.	Desiccator	7
12.	Magnetic stirrer	7
13.	Laboratory glassware	10
14.	Reagent bottles	10
15.	Sample containers	10
16.	Feed sampling probes	10
17.	Laboratory refrigerators	5
18.	Laboratory freezers	5
19.	Microscopes	5
20.	Digital nutrient analyzers	5
21.	Near Infrared Spectroscopy (NIRS) analyzer	5

APICULTURE AND MINI-LIVESTOCK EQUIPMENT LABORATORY

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Beehives	5
2.	Honey extractors	5
3.	Bee suits and gloves	10
4.	Smokers	10
5.	Hive tools	10
6.	Honey storage containers	12
7.	Snailery pens	10
8.	Grasscutter cages	10
9.	Rabbit hutches	10
10.	Mini-livestock feeders and drinkers	10

F. MEAT PROCESSING AND ABATTOIR EQUIPMENT

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Slaughter slabs	2
2.	Electric stunners	5

3.	Carcass saws	5
4.	Meat cutting tables	5
5.	Knives and sharpening tools	20
6.	Dehairing machines	10
7.	Skinning equipment	10
8.	Meat mincers	10
9.	Meat grinders	10
10.	Meat smoking units	10
11.	Meat drying equipment	10
12.	Cold rooms	5
13.	Refrigerated storage units	5
14.	Blast freezers	5
15.	Vacuum packaging machines	10
16.	Meat weighing scales	20
17.	Carcass hooks and rails	20
18.	Sterilization tanks	10
19.	Waste disposal systems	5
20.	Effluent treatment systems	5
21.	Meat inspection kits	10
22.	Hides and skin processing equipment	10

G. PASTURE AND RANGE MANAGEMENT EQUIPMENT

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Forage harvesters	5
2.	Disc mowers	5
3.	Balers	5
4.	Irrigation systems	5
5.	Grass cutters	5
6.	Soil testing kits	5
7.	Pasture seeders	5
8.	Fodder conservation equipment	5
9.	Silage bags and silos	10
10.	Hay storage facilities	5

11.	Pasture moisture meters	5
12.	Drone mapping systems	5
13.	Quadrat	20
14.	Tractor and implements	2
15.	Water Reticulation equipment	assorted
16.	Planters	10

H. SHEEP AND GOAT MANAGEMENT EQUIPMENT

S/N	DESCRIPTION OF ITEMS	QUANTITY
1.	Sheep and Goat	30no. each
2.	Drenching guns	20
3.	Hoof trimming kits	20
4.	Sheep handling crates	20
5.	Goat milking equipment	20
6.	Portable fencing systems	10
7.	Grazing management tools	10
8.	Mineral lick dispensers	10
9.	Crush	2
10.	Weighing balance	varieties
11.	Ear tags	4 packs
12.	Ear Tagging machine	4

I. POULTRY PRODUCTION AND HATCHERY EQUIPMENT

S/N	EQUIPMENT	QUANTITY
1.	Egg incubators	5
2.	Hatchery units	1
3.	Automatic hatching Machine	1
4.	Candling machines	5
5.	Egg trays	100
6.	Egg graders	100
7.	Egg washing machines	10
8.	Egg storage refrigerators	2
9.	Chick boxes	5

10.	Poultry feeders	100
11.	Brooder unit	1
12.	Poultry drinkers	100
13.	Battery cages	5
14.	Poultry weighing scales	5
15.	Ventilation fans	50
16.	Poultry vaccination equipment	10
17.	Poultry debeakers	4
18.	Feed and water troughs	100 each.
19.	Litter management equipment	-
20.	Broiler and Layer birds	1000no. each

J. AIRY PRODUCTION EQUIPMENT

S/N	EQUIPMENT	QUANTITY
1.	Milking parlor	1
2.	Hand Held milking machines	2
3.	Milk cans	10
4.	Milk storage tanks	10
5.	Milk cooling tanks	10
6.	Pasteurizers	10
7.	Sterilizers	10
8.	Cream separators	3
9.	Milk analyzers	5
10.	Butter churners	5
11.	Cheese processing equipment	5
12.	Yogurt processing equipment	5
13.	Dairy hygiene kits	5
14.	Udder washing systems	5
15.	Somatic cell counters	5
16.	Dairy laboratory kits	5
17.	Refrigerated transport units	5
18.	Dairy cow	5
18.	Digital Scales	2
19.	Manure Management equipment	

K. SWINE PRODUCTION EQUIPMENT

S/N	EQUIPMENT	QUANTITY
1.	Farrowing crates	5
2.	Piglet creep feeders	5
3.	Pig feeders	10
4.	Nipple drinkers	10
5.	Swine weighing scales	10
6.	Pig handling boards	10
7.	Pig restraining equipment	10
8.	Pig waste management systems	-
9.	Swine housing ventilation systems	10
10.	Swine heating systems	10
11.	Artificial insemination kits for pigs	5

FIELD FACILITIES

Silage pits

Meteorological Station

Hay Barns

Spray race

Dips

Crush

Established Pasture

Cold room

WORKSHOPS

Metal/Wood/Maintenance

ITEM	QUANTITY
WOOD WORK SECTION	
Working benches with vice	10
Band saw	2
Surface planer	2
Thickness planer	2
Drilling machine	1
HAND TOOLS	
Saws, chisel, try square, gauges, rulers, screwdrivers, set of drin bit hammers, pincers, oil stones, planners etc.	15
METAL WORK SECTION:	
Lathe machine	1
Pipe benders	3
Anvils	3
Micrometers (insides, outside)	1
Stock and dice set	5
Drill sets	5
Electrical hand drills	2
Hydraulic jack 12 and 15 tons	1
Tool boxes	5
Box of drill	4
Battery charger	1
Grease gun	2
Pipe cutters	1
Scribers	1
Steel ruler	5
Mallet sets	2
Pipe screwing – threading	2
Arch welding equipment working benches	8
Arc welder	42
Electric grinder	2
Welding gloves	15
Welding helmet	15
Wire brush	5

Welding boots and screen Soldering equipment	15
Blow torch	
Tin snips	4
Soldering flux	4
Sheet metal sheer	4
Mallet hammer	4
Hack saw	4
Oxygen and acetylene bottles	4
Oxygen and acetylene regulator	2
Cylinder wrenches	2
Spark lighter	3
	5

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