



NATIONAL BOARD FOR TECHNICAL EDUCATION

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

NATIONAL DIPLOMA

IN

VETERINARY LABORATORY TECHNOLOGY

CURRICULUM AND COURSE SPECIFICATIONS

JUNE, 2026

PREFACE

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

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

Professor Idris M. Bugaje, FNSE
Chairman, Implementation Committee

EXECUTIVE SECRETARY

National Board for Technical Education (NBTE), Kaduna

ACKNOWLEDGEMENT

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

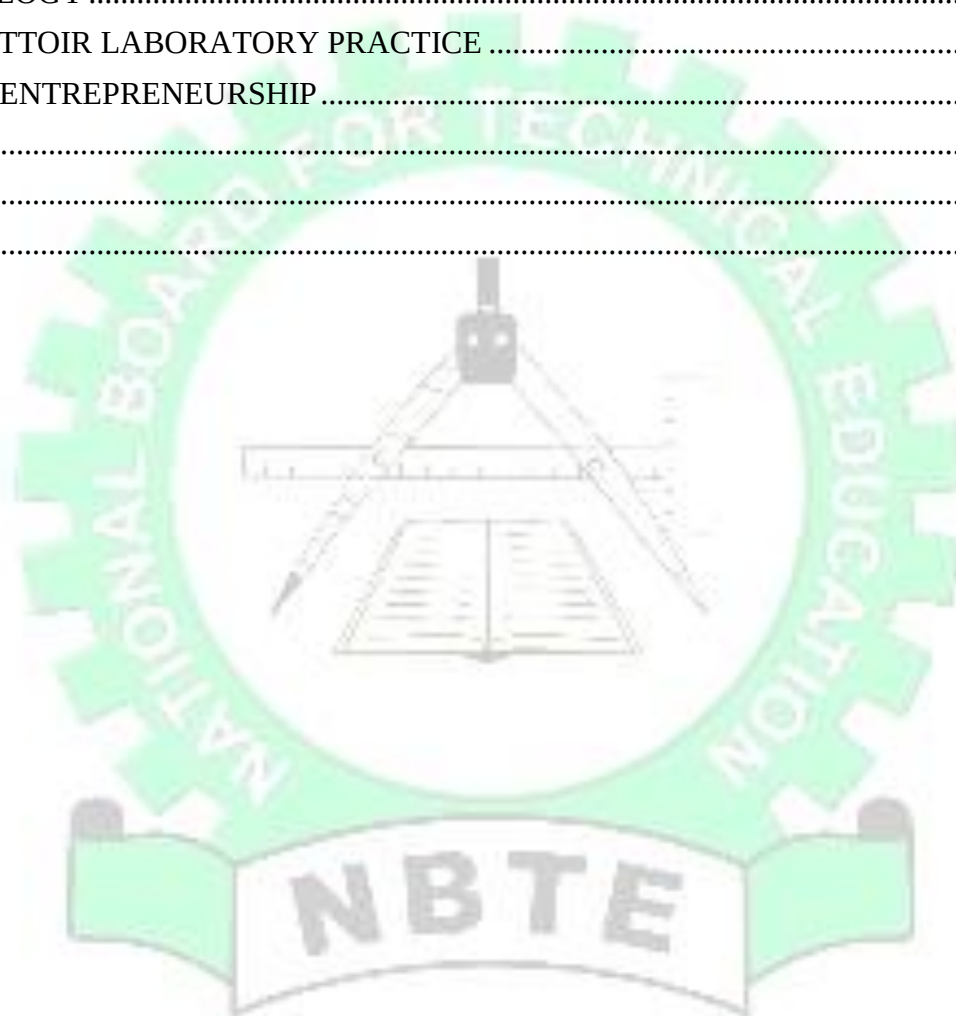
Special appreciation is extended to the curriculum specialists, resource persons, academic experts, professional bodies, regulatory agencies, employers, industry practitioners, development partners, and representatives of public and private sector organizations who participated actively in the skills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



TABLE OF CONTENTS

PREFACE	i
ACKNOWLEDGEMENT	ii
General Information.....	v
Curriculum Table	xi
Year I – Semester I	1
INTRODUCTION TO VETERINARY LABORATORY TECHNOLOGY	2
INTRODUCTION TO VETERINARY PARASITOLOGY	13
LABORATORY ANIMAL STUDIES.....	25
ANIMAL HANDLING AND WELFARE I.....	33
LIVESTOCK PRODUCTION SYSTEMS.....	47
BIOLOGY OF DOMESTIC ANIMALS.....	57
YEAR I SEMESTER II	67
INTRODUCTION TO ANIMAL DISEASES	68
INTRODUCTION TO VETERINARY DRUGS.....	86
ANIMAL ANATOMY AND PHYSIOLOGY.....	107
Veterinary Laboratory Procedure I.....	120
ANIMAL HANDLING AND WELFARE II	128
FIELD AND POINT-OF-CARE VETERINARY DIAGNOSTICS	141
YEAR II SEMESTER II.....	148
INTRODUCTION TO VETERINARY PATHOLOGY	149
INTRODUCTION TO VETERINARY MICROBIOLOGY	164
INTRODUCTION TO VETERINARY SURGERY.....	171
VETERINARY LABORATORY PROCEDURES II.....	184
FEED AND NUTRITION DIAGNOSTICS	190
ZOONOTIC DISEASE SURVEILLANCE	205

YEAR II SEMESTER II.....	210
RECORD KEEPING AND DATA MANAGEMENT.....	211
BASIC VETERINARY TOXICOLOGY	216
MEAT INSPECTION AND ABATTOIR LABORATORY PRACTICE	229
VETERINARY LABORATORY ENTREPRENEURSHIP	233
RADIOLOGY.....	239
VETERINARY NURSING	244
LIST OF PARTICIPANTS.....	270



GENERAL INFORMATION**1.0 TITLE OF THE PROGRAMME**

The title of the programme is National Diploma (ND) in Veterinary Laboratory Technology

2.0 PROGRAMME GOAL

The National Diploma in Veterinary Laboratory Technology prepares diplomates as middle-level technicians to collect and process specimens, perform routine veterinary laboratory diagnostic procedures, support animal disease surveillance and control, and provide quality laboratory services in line with biosafety, ethical and global best-practice standards for veterinary and animal-health laboratories.

3.0 OBJECTIVES OF THE PROGRAMME

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

- i. Collect, label, transport and process a wide range of veterinary clinical and pathological specimens;
- ii. Perform routine parasitological, microbiological, haematological, serological and clinical chemistry laboratory procedures;
- iii. Operate, calibrate and maintain common veterinary laboratory equipment and instruments;
- iv. Apply biosafety, biosecurity and quality-control practices in the laboratory;
- v. Assist in the diagnosis of animal diseases and in disease surveillance and zoonoses control;
- vi. Handle and restrain animals and laboratory animals humanely and support veterinary nursing and clinical procedures;
- vii. Keep accurate laboratory records, manage data and provide laboratory support and advisory services within relevant regulatory and ethical standards.

4.0 ENTRY REQUIREMENTS

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

- i. Four(4) O'Level credit passes in relevant subjects, including Mathematics, Biology or Agricultural Science, Chemistry, or and one of Physics, Geography or Health Science or other relevant subject. At least a pass in English language is mandatory.
- ii. Evidence of registration with JAMB.

5.0 STRUCTURE AND DURATION OF THE PROGRAMME

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

Each semester shall consist of 17 weeks made up as follows:

- 15 contact weeks of teaching (lectures, practicals and fieldwork);
- 2 weeks for registration and examinations.

6.0 Curriculum Structure

The curriculum of the ND Veterinary Laboratory Technology Programme consists of four main components:

- a. General Studies/General Education Courses
- b. Foundation Courses
- c. Professional Courses
- d. Students' Industrial Work Experience Scheme (SIWES)

7.0 STAFFING REQUIREMENTS

7.1 Core Teaching Staff

A minimum of four (4) core teaching staff who should possess at least HND, B.Sc. or equivalent qualification in Doctor of veterinary Medicine, veterinary laboratory technology, Animal health technology or related disciplines.

7.2 TECHNICAL STAFF

i. Technologist

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

ii. Technician

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

iii. Field Assistant

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

7.3 Headship of the Department

The Head of Department shall possess at least a HND or First Degree and Master's Degree in Doctor of Veterinary Medicine, Veterinary Laboratory Technology or a related discipline. He or she shall not be less than the rank of a Senior Lecturer, shall be registered with a relevant Professional Body and shall have a minimum of twelve (12) years' experience in both academic and industry.

8.0 CERTIFICATION

A diplomate of this Programme shall be awarded National Diploma (ND) in Veterinary Laboratory Technology.

9.0 CONDITIONS FOR THE AWARD OF ND

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

9.1 Grading of Courses: Courses shall be graded as follows:

MARK RANGE	LETTER GRADE	WEIGHTING
75% and above	A	4.00
70% – 74%	AB	3.50
65% – 69%	B	3.25
60% – 64%	BC	3.00
55% – 59%	C	2.75
50% – 54%	CD	2.50
45% – 49%	D	2.25
40% – 44%	E	2.00
Below 40%	F	0.0

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

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

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 SIWES PROGRAMME

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

14.1 Responsibility for placement of Students.

- a. Institution offering the ND programme shall arrange to place the students in relevant industries. By the end of second semester of the first academic session, six copies of the master list showing where each student has been placed shall be submitted to the Executive Secretary, NBTE, who shall, in turn authenticate the list and forward it to the Industrial Training Fund, Jos.
- b. The Placement Officer should discuss and agree with the various industries on the following:
 - i. A task inventory of what the student is expected to experience during the period of attachment. It may be wise to adopt the one already approved for each field by the industry-based supervisor.
 - ii. The evaluation of the student by the industry-based supervisor and the institution-based supervisor.
 - iii. The final grading of the student during the period of attachment should be weighted more on the evaluation by industry-based supervisor.

14.2 Evaluation of Student during the SIWES

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

- i. Punctuality
- ii. Attendance
- iii. General attitude to work
- iv. Routine report of weekly activities in the logbook
- v. Respect for authority
- vi. Interest in the field/technical area
- vii. Technical competence as a potential technician in his field.

14.3 Grading of SIWES

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

14.4 The Institution based Supervisor

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

14.5 Frequency of visit

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

- i. There is another visit six weeks after the first visit; and
- ii. A final visit in the last month of the attachment.

14.6 Stipend for Students in SIWES

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

14.7 SIWES as a component of the Curriculum

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

15.0 GUIDELINES ON MANDATORY SKILLS QUALIFICATIONS (MSQ)

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

CURRICULUM TABLE

YEAR I – SEMESTER I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 101	Use of English I	2	0	0	2	2
2.	GNS 111	Citizenship Education I	2	0	0	2	2
3.	MSQ 111	Mandatory Skills Qualification	1	0	1	2	2
4.	STP 111	Mechanics	2	0	1	3	3
5.	STC 112	Inorganic Chemistry I	2	0	1	3	3
6.	COM 111	Introduction to Computing	2	0	2	4	4
7.	VLT 111	Introduction to Veterinary Laboratory Technology	1	0	2	3	3
8.	VLT 112	Introduction to Veterinary Parasitology	1	0	3	4	4
9.	VLT 113	Laboratory Animal Studies	1	0	1	2	2
10.	VLT 114	Animal Handling and Welfare I	1	0	3	4	4
11.	VLT 115	Livestock Production Systems	1	0	2	3	3
12.	VLT 116	Biology of Domestic Animals	2	0	2	4	4
TOTAL			18	0	18	36	36

YEAR I – SEMESTER II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 102	Communication in English I	2	0	0	2	2
2.	GNS 121	Citizenship Education II	2	0	0	2	2
3.	ENT 126	Introduction to Entrepreneurship I	2	0	1	3	3
4.	STC 121	Organic Chemistry I	2	0	1	3	3
5.	STP 122	Optics and Waves	2	0	1	3	3
6.	VLT 121	Introduction to Animal Diseases	1	0	3	4	4
7.	VLT 122	Introduction to Veterinary Drugs	1	0	2	3	3
8.	VLT 123	Animal Anatomy and Physiology	2	0	2	4	4
9.	VLT 124	Veterinary Laboratory Procedures I	1	0	3	4	4
10.	VLT 125	Animal Handling and Welfare II	1	0	3	4	4
11.	VLT 126	Field and Point-of-Care Veterinary Diagnostics	1	0	2	3	3
TOTAL			17	0	18	35	35

YEAR II – SEMESTER I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 201	Use of English II	2	0	0	2	2
2.	ENT 216	Introduction to Entrepreneurship II	2	0	1	3	3
3.	AGR 211	Research Methods and Experimental Design	1	0	1	2	2
4.	VLT 211	Introduction to Veterinary Pathology	1	0	2	3	3
5.	VLT 212	Introduction to Veterinary Microbiology	1	0	2	3	3
6.	VLT 213	Introduction to Veterinary Surgery	1	0	2	3	3
7.	VLT 214	Veterinary Laboratory Procedures II	1	0	2	3	3
8.	VLT 215	Feed and Nutrition Diagnostics	1	0	2	3	3
9.	VLT 216	Zoonotic Disease Surveillance	1	0	1	2	2
10.	VLT 217	Students Industrial Work Experience Scheme (SIWES)	0	0	4	4	4
TOTAL			11	0	17	28	28

YEAR II – SEMESTER II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 122	Communication in English II	2	0	0	2	2
2.	STC 222	Introduction to Biochemistry	1	0	1	2	2
3.	VLT 221	Record Keeping and Data Management	1	0	2	3	3
4.	VLT 222	Basic Veterinary Toxicology	1	0	2	3	3
5.	VLT 223	Meat Inspection and Abattoir Laboratory Practice	1	0	2	3	3
6.	VLT 224	Veterinary Laboratory Entrepreneurship	1	0	1	2	2
7.	VLT 225	Radiology	1	0	1	2	2
8.	VLT 226	Veterinary Nursing	1	0	2	3	3
9.	VLT 226	Project	0	0	4	4	4
TOTAL			9	0	15	24	24



INTRODUCTION TO VETERINARY LABORATORY TECHNOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO VETERINARY LABORATORY TECHNOLOGY	COURSE CODE: VLT 111	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 Veterinary Laboratory Technology		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Know the history of veterinary laboratory technology in Nigeria; 2.0 Understand common terminologies used in veterinary laboratory technology; 3.0 Understand the Organisation and structure of veterinary laboratories; 4.0 Understand the role of the veterinary laboratory in livestock value chain; 5.0 Understand professional ethics, Standard Operating Procedure (SOP) in veterinary laboratories; 6.0 Understand the regulatory framework governing veterinary laboratories in Nigeria; 7.0 Understand the relationship between the veterinary laboratory technicians and other stakeholders in the value chain; 8.0 Understand contemporary trends in veterinary laboratory technology ; 9.0 Understand career pathways and continuing professional development for the veterinary laboratory technician.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY LABORATORY TECHNOLOGY			COURSE CODE: VLT 111		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 veterinary laboratory technology.						
GENERAL OBJECTIVE 1.0: Know the history of veterinary laboratory technology 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 Define veterinary laboratory technology. 1.2 Trace the global history of veterinary laboratory science from early empirical observation to germ theory (Pasteur, Koch) to molecular diagnostics. 1.3 Describe the development of veterinary laboratory technology in Nigeria 1.4 Explain the role of NVRI (National Veterinary Research	• Explain veterinary laboratory technology. • Trace the global history of veterinary laboratory science from early empirical observation to germ theory (Pasteur, Koch) to molecular diagnostics. • Explain the development of veterinary laboratory technology in Nigeria	Whiteboard, projector. textbooks Internet Chart Journals,etc.	• Identify public and private laboratories • Identity specimen, equipment, reagents and their applications	Guide students to: • Identify public and private laboratories • Identity specimen, equipment, reagents and their applications	Map of Nigeria. Logistics for students and instructor

	Institute, Vom) as Nigeria's premier veterinary laboratory. 1.5 Highlight other major Nigerian veterinary laboratories. 1.6 Explain global veterinary laboratory networks. 1.7 Explain the relationship between veterinary laboratory technology and Veterinary Council of Nigeria (VCN) regulation.	• Explain the role of NVRI (National Veterinary Research Institute, Vom) as Nigeria's premier veterinary laboratory. • Highlight other major Nigerian veterinary laboratories. • Explain global veterinary laboratory networks. • Discuss the relationship between veterinary laboratory technology and Veterinary Council of Nigeria (VCN) regulation.				
GENERAL OBJECTIVE 2.0: Understand common terminologies used in veterinary laboratory technology.						
3	2.1 Define laboratory disciplines: - Haematology, - Clinical biochemistry, - Microbiology, - Parasitology, - Entomology, - Histopathology, - Molecular biology,	• Discuss laboratory disciplines: — Haematology — Clinical biochemistry, — Microbiology, — Parasitology, — Entomology, — Histopathology, — Molecular biology,	Whiteboard, projector, textbooks, Internet, Chart, Journals, etc.	• Identify common laboratory items such as specimen, reagents, weighing scales, sample bottles • Identify hand gloves, nose mask, eye glasses, headgears, lab	Guide students to: • Identify common laboratory items such as specimen, reagents, weighing scales, sample bottles • Identify hand gloves, nose mask, eye glasses, headgears, lab coat, autoclave,	Specimen, reagents, weighing scales, sample bottles, PPE

viii. Toxicology, ix. Immunology, x. Virology, xi. Bacteriology, xii. Mycology. 2.2 Explain common laboratory terms: Specimen, sample, aliquot, reagent, control, standard, calibration, accuracy, precision, sensitivity, specificity. 2.3 Describe analytical terms: qualitative, quantitative, positive/negative control, reference range. 2.4 Describe quality assurance terms: SOP (Standard Operating Procedure), QC (Quality Control), QA (Quality Assurance), audit, traceability. 2.5 Explain result-reporting terms: normal, abnormal, equivocal, reactive, non-reactive, titre, dilution, threshold.	— Toxicology, — Immunology, — Virology, — Bacteriology, — Mycology. • Explain common laboratory terms — specimen, sample, aliquot, reagent, control, standard, calibration, accuracy, precision, sensitivity, specificity. • Describe analytical terms: qualitative, quantitative, positive/negative control, reference range. • Describe quality assurance terms: SOP (Standard Operating Procedure), QC (Quality Control), QA (Quality Assurance), audit, traceability. • Explain result-reporting terms: normal, abnormal, equivocal, reactive, non-reactive, titre,		coat, autoclave, hot air oven	hot air oven	
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	2.6 Describe biosafety terms: BSL (Biosafety Level), PPE (Personal Protective Equipment), aerosol, biohazard, decontamination, sterilisation, disinfection. 1.8 Describe digital laboratory terms: LIMS (Laboratory Information Management System), barcode.	dilution, threshold. • Discuss biosafety terms: BSL (Biosafety Level), PPE (Personal Protective Equipment), aerosol, biohazard, decontamination, sterilisation, disinfection. • Describe digital laboratory terms: LIMS (Laboratory Information Management System), barcode.				
GENERAL OBJECTIVE 3.0: Understand the organisation and structure of veterinary laboratories.						
4	3.1 Explain the typical layout of a veterinary laboratory. 3.2 Describe the laboratory equipment areas. 3.3 Explain layout principles. 3.4 Describe the roles of laboratory team. 3.5 Explain sample-flow workflow. 3.6 Describe documentation hierarchy. 3.7 Describe utilities supply.	• Describe the typical layout of a veterinary laboratory. • Discuss the laboratory equipment areas. • Describe layout principles. • Describe the roles of laboratory team. • Explain sample-flow workflow. • Describe	Whiteboard, projector, textbooks Internet Chart Journals, etc.	• Tour the institutional veterinary laboratory • Identify each section and equipment. • Draw a workflow diagram of a sample's journey from reception to reporting.	Guide student to: • Tour the institutional veterinary laboratory • Identify each section and equipment. • Draw a workflow diagram of a sample's journey from reception to reporting. • Design a laboratory organogram with 10 positions.	Institutional laboratory access. Workflow diagram template. Organogram template. Quality manual sample.

	3.8 Differentiate types of veterinary laboratories by scope.	documentation hierarchy. • Discuss utilities supply. • Differentiate types of veterinary laboratories by scope.		• Design a laboratory organogram with 10 positions.		
GENERAL OBJECTIVE 4.0: Understand the role of the veterinary laboratory in livestock value chain.						
5-6	4.1 Describe the role of the veterinary laboratory technologist. 4.2 Describe scope of practice and limitations. 4.3 Explain the role in clinical diagnosis. 4.4 Explain the role in Disease Surveillance. 4.5 Describe the role in public health. 4.6 Describe the role in research support. 4.7 Describe the role in Livestock Production 4.8 Explain the role in meat inspection. 4.9 Describe the role in animal welfare. 4.10 Describe career pathway in Veterinary Laboratory.	• Explain the role of the veterinary laboratory technologist. • Discuss scope of practice and limitations. • Discuss the role in clinical diagnosis. • Explain the role in Disease Surveillance. • Explain the role in public health. • Describe the role in research support. • Discuss the role in Livestock Production • Explain the role in meat inspection. • Describe the role in animal welfare.	Whiteboard, projector, textbooks Internet Chart Journals, etc.	• Conduct poultry support exercise. • Conduct dairy support exercise. • Conduct small-ruminant exercise. • Coordinate clinic visit. Career research.	Guide student to: • Conduct poultry support exercise. • Conduct dairy support exercise. small-ruminant exercise. • Coordinate clinic visit. career research.	Case scenarios. Transport for visit. Career research materials.

		Discuss career pathway in Veterinary Laboratory.				
GENERAL OBJECTIVE 5.0: Understand professional ethics, Standard Operating Procedure (SOP) in veterinary laboratories.						
7-8	5.1 Explain professional ethics in the veterinary laboratory 5.2 Describe client confidentiality. 5.3 Explain biosafety levels. 5.4 Describe biosafety levels. 5.5 Describe laboratory safety. 5.6 Explain biomedical waste management. 5.7 Describe zoonotic risk awareness. 5.8 Explain emergency response. 5.9 Describe documenting and reporting accidents and incidents.	- Describe professional ethics in the veterinary laboratory - Describe client confidentiality. - Explain biosafety levels. - Discuss biosafety levels. - Describe laboratory safety. - Describe biomedical waste management. - Explain zoonotic risk awareness. - Describe emergency response. - Discuss documenting and reporting accidents and incidents.	Whiteboard, projector. textbooks Internet Chart Journals, etc.	Carry out donning and doffing of PPE.	Guide students to; Demonstrate donning and doffing of PPE.	Self-assessment template Case studies. Internet for WHO module. PPE samples. Checklist template.
GENERAL OBJECTIVE 6.0: Understand the regulatory framework governing veterinary laboratories in Nigeria						
9	6.1 Describe Veterinary	Explain Veterinary	Whiteboard,	Identify how to	Guide the student to:	VCN

Council of Nigeria (VCN). 6.2 Describe the procedure NBTE accreditation of ND VLT programmes. 6.3 Explain ISO/IEC 17025. 6.4 Describe NiNAS (Nigeria National Accreditation Service). 6.5 Describe SON (Standards Organisation of Nigeria) 6.6 Describe NAFDAC role in veterinary diagnostics for veterinary medicinal products and biologicals. 6.7 Explain FMARD (Federal Ministry of Agriculture and Rural Development) and Department of Veterinary and Pest Control Services. 6.8 Describe state veterinary regulations and ministry oversight. 6.9 Discuss international frameworks (OIE/WOAH, FAO, WHO; quadripartite One Health alliance, WHO, FAO, OIE, UNEP). 6.10 Describe the	Council of Nigeria (VCN). • Discuss the procedure NBTE accreditation of ND VLT programmes. • Describe ISO/IEC 17025. • Describe NiNAS (Nigeria National Accreditation Service). • Discuss SON (Standards Organisation of Nigeria) • Describe NAFDAC role in veterinary diagnostics for veterinary medicinal products and biologicals. • Describe FMARD (Federal Ministry of Agriculture and Rural Development) and Department of Veterinary and Pest Control Services. • Discuss state veterinary	projector. textbooks Internet Chart Journals,etc.	Review VCN registration requirements for veterinary laboratory technologists. • Research how a private veterinary laboratory would be registered in the student's home state. • Visit (in-person or virtual) the VCN office or a state veterinary department. • ISO/IEC 17025-accredited veterinary laboratories in Nigeria.	• Identify how to Review VCN registration requirements for veterinary laboratory technologists. • Research how a private veterinary laboratory would be registered in the student's home state. • Visit (in-person or virtual) the VCN office or a state veterinary department. • ISO/IEC 17025-accredited veterinary laboratories in Nigeria.	materials. Internet access. Transport for visit.
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	regulatory process for setting up a private veterinary laboratory in Nigeria.	regulations and ministry oversight. • Explain international frameworks (OIE/WOAH, FAO, WHO; quadripartite One Health alliance, WHO, FAO, OIE, UNEP). • Discuss the regulatory process for setting up a private veterinary laboratory in Nigeria.				
GENERAL OBJECTIVE 7.0: Understand the relationship between the veterinary laboratory, the clinical veterinarian, livestock farmers and public health.						
10	7.1 Explain the laboratory-clinician relationship. 7.2 Describe the laboratory-farmer relationship. 7.3 Describe communication between laboratory and clinician — sample submission, urgent results, interpretive comments. 7.4 Explain communication with farmers. 7.5 Describe the role in	• Describe the laboratory-clinician relationship. • Discuss the laboratory-farmer relationship. • Explain communication between laboratory and clinician — sample submission, urgent results, interpretive	Whiteboard, projector, textbooks Internet Chart Journals, etc.	• Identify how to review 5 sample veterinary submission forms • Identify essential fields. • Identify how to review 5 sample laboratory reports • Identify clinical decision points. • Identify how to design a sample-	Guide students to: • Identify how to review 5 sample veterinary submission forms • Identify essential fields. • Identify how to review 5 sample laboratory reports • Identify clinical decision points. • Identify how to	Sample forms. Sample reports. Protocol template. Role-play scenarios.

	herd/flock health management. 7.6 Describe the role in export certification of livestock and livestock products. 7.7 Explain the role in public health. 7.8 Describe one health concept. 7.9 Explain inter-agency collaboration. 7.10 Describe common scenarios where laboratory results drive farm decisions.	comments. • Describe communication with farmers. • Discuss the role in herd/flock health management. • Describe the role in export certification of livestock and livestock products. • Discuss the role in public health. • Describe one health concept. • Describe inter-agency collaboration. • Discuss common scenarios where laboratory results drive farm decisions.		submission protocol for a commercial dairy farm. • Role-play lab-to-veterinarian phone consultation about an urgent result. • Identify the Nigerian One Health initiatives.	design a sample-submission protocol for a commercial dairy farm. • Role-play lab-to-veterinarian phone consultation about an urgent result. • Identify the Nigerian One Health initiatives.	
GENERAL OBJECTIVE 8.0: Understand contemporary trends in veterinary laboratory technology						
11	8.1 Explain digitalisation trends 8.2 Describe automation trends 8.3 Explain point-of-care (POC) testing 8.4 Describe digital	• Describe digitalisation trends • Explain automation trends • Describe point-of-care (POC) testing • Discuss digital	Whiteboard, projector, textbooks Internet Chart Journals, etc.	• Research 5 LIMS systems available globally. • Observe a demonstration video of a modern automated	Guide students to: • Research 5 LIMS systems available globally. • Observe a demonstration video of a modern	Internet access. Video resources. Discussion prompts.

	microscopy. 8.5 Describe artificial intelligence applications in veterinary diagnostics 8.6 Explain remote sensing and digital surveillance. 8.7 Describe one health and globalisation of veterinary laboratory practice. 8.8 Describe sustainability and green laboratory initiatives. 8.9 Explain the implications for the Nigerian veterinary laboratory technologist of the day.	microscopy. • Explain artificial intelligence applications in veterinary diagnostics • Describe remote sensing and digital surveillance. • Explain one health and globalisation of veterinary laboratory practice. • Describe sustainability and green laboratory initiatives. • Discuss the implications for the Nigerian veterinary laboratory technologist of the day.		haematology analyser. • Explore POC testing devices online. • Group discussion: identify the biggest digital transformation needs of Nigerian veterinary laboratories.	automated haematology analyser. • Explore POC testing devices online. • Group discussion: identify the biggest digital transformation needs of Nigerian veterinary laboratories.	
COURSE ASSESSMENT: Course Work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

INTRODUCTION TO VETERINARY PARASITOLOGY

PROGRAMME: NATIONAL DIPLOMA VETERINARY LABORATORY TECHNOLOGY		
COURSE: INTRODUCTION TO VETERINARY PARASITOLOGY	COURSE CODE: VLT 112	CREDIT UNIT: 4 HOURS/WEEK
	CONTACT HOURS: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with the knowledge and skills to identify, diagnose, prevent and control parasitic infections of livestock and poultry		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles of animal parasitology; 2.0 Know the morphology, life cycle, pathology and control of trematodes (flukes); 3.0 Know the morphology, life cycle, pathology and control of cestodes (tapeworms); 4.0 Know the morphology, life cycle, pathology and control of nematodes (roundworms); 5.0 Understand the classification, life cycle, pathology and control of protozoan parasites of farm animals; 6.0 Know the economic importance and control of insect parasites (lice, fleas, flies) of livestock and poultry; 7.0 Know the economic importance and control of ticks and mites of livestock and poultry; 8.0 Know diagnostic techniques for parasitic infections; 9.0 Understand integrated parasite management, anthelmintic resistance, climate-smart parasite control and zoonotic parasites.		

PROGRAMME: NATIONAL DIPLOMA VETERINARY LABORATORY TECHNOLOGY

COURSE: INTRODUCTION TO VETERINARY PARASITOLOGY	COURSE CODE: VLT 112	CREDIT UNIT: 4 HOURS/WEEK
	CONTACT HOURS: 4	THEORETICAL: 1 HOUR/WEEK

YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
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COURSE SPECIFICATION: THEORETICAL AND PRACTICAL

GOAL: This course is designed to equip students with the knowledge and skills to identify, diagnose, prevent and control parasitic infections of livestock and poultry

General Objective 1.0: Understand the principles of animal parasitology.

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1-2	1.1 Define parasitology and related terms (parasite, host, parasitism, vector, pathogen). 1.2 Explain the classification of parasites into ectoparasites, endoparasites, obligate, facultative, periodic and permanent parasites. 1.3 Outline the major parasites of veterinary importance (helminths, protozoa, arthropods). 1.4 State the types of hosts (definitive, intermediate, paratenic, reservoir) and their roles in parasite life cycles. 1.5 Outline the economic	• Explain parasitology and related terms (parasite, host, parasitism, vector, pathogen). • Discuss the classification of parasites into ectoparasites, endoparasites, obligate, facultative, periodic and permanent parasites. • Explain the major parasites of veterinary importance (helminths, protozoa, arthropods). • Discuss the types of hosts (definitive, intermediate, paratenic, reservoir) and their roles in parasite life cycles.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.			

	and public-health importance of parasitic diseases of livestock in Nigeria.	Describe the economic and public-health importance of parasitic diseases of livestock in Nigeria.				
General Objective 2.0: Know the morphology, life cycle, pathology and control of trematodes (flukes)						
2-3	2.1 Explain the general external and internal morphology of trematodes. 2.2 Describe the life cycle of <i>Fasciola</i> spp. 2.3 Describe other trematodes of veterinary importance (<i>Paramphistomum</i>, <i>Schistosoma</i>, <i>Dicrocoelium</i>, <i>Fascioloides</i>).. 2.4 Explain the life cycle of <i>Fasciola gigantica</i> and <i>F. hepatica</i>. 2.5 Describe the pathology, clinical signs and post-mortem lesions of fasciolosis and other trematode infections. 2.6 Outline prevention and control measures against helminth parasites of animals	- Describe the general external and internal morphology of trematodes. - Discuss the life cycle of <i>Fasciola</i> spp. - Describe other trematodes of veterinary importance (<i>Paramphistomum</i>, <i>Schistosoma</i>, <i>Dicrocoelium</i>, <i>Fascioloides</i>).. - Discuss the life cycle of <i>Fasciola gigantica</i> and <i>F. hepatica</i>. - Discuss the pathology, clinical signs and post-mortem lesions of fasciolosis and other trematode infections. - Explain prevention and control measures against helminth parasites of animals	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	- Examine preserved adult flukes (<i>Fasciola</i>, <i>Paramphistomum</i>, <i>Schistosoma</i>) - Identify diagnostic features. - Identify trematode eggs in faecal samples using sedimentation technique. - Inspect livers infested with flukes. - Identify livers condemned due to fluke infestation. - Identify snails (<i>Lymnaea</i>, <i>Bulinus</i>) as an	Guide students to: - Examine preserved adult flukes (<i>Fasciola</i>, <i>Paramphistomum</i>, <i>Schistosoma</i>) - Identify diagnostic features. - Identify trematode eggs in faecal samples using sedimentation technique. - Inspect livers infested with flukes. - Identify livers condemned due to fluke infestation. - Identify snails (<i>Lymnaea</i>, <i>Bulinus</i>) as an intermediate host from local water bodies.	Preserved flukes, microscopes, slides. Faecal samples, beakers, sieves, formalin. Dissecting kits, Hand lens, infected livers (from abattoir). Snail collection nets, sample bottles. PPE.

				intermediate host from local water bodies.		
General Objective 3.0: Know the morphology, life cycle, pathology and control of cestodes (tapeworms)						
4 - 5	3.1 3.1 Describe the general morphology of cestodes (scolex, neck, immature/mature/gravid proglottids, strobila). 3.2 Describe the life cycle and pathology of <i>Moniezia spp</i> in ruminants. 3.3 Describe <i>Taenia spp.</i> (<i>T. saginata</i>, <i>T. solium</i>, <i>T. ovis</i>, <i>T. hydatigena</i>) and their cysticerci in farm animals. 3.4 3.4 Describe <i>Echinococcus granulosus</i> and the epidemiology of hydatidosis 3.5 Explain <i>Dipylidium caninum</i>, <i>Raillietina spp.</i> (poultry) and <i>Anoplocephala perfoliata</i> (equine). 3.6 Outline the zoonotic importance of cestodes	• Explain the general morphology of cestodes (scolex, neck, immature/mature/gravid proglottids, strobila). • Explain the life cycle and pathology of <i>Moniezia spp</i> in ruminants. • Explain <i>Taenia spp.</i> (<i>T. saginata</i>, <i>T. solium</i>, <i>T. ovis</i>, <i>T. hydatigena</i>) and their cysticerci in farm animals. • Explain <i>Echinococcus granulosus</i> and the epidemiology of hydatidosis. • Describe <i>Dipylidium caninum</i>, <i>Raillietina spp</i> (poultry) and <i>Anoplocephala perfoliata</i> (equine). • Explain the zoonotic importance of cestodes	Charts. Projector white board, Marker Text books, Internet, Lecture note,etc.	• Examine preserved adult nematodes • Identify diagnostic features. • Perform faecal flotation • Identify nematode eggs. • Conduct McMaster faecal egg counts (FEC) • Set up coproculture • Identify L3 larvae of trichostrongyle s. • Conduct post-mortem of GIT to recover • Identify nematodes. • Identify lungworms by	Guide students to: • Examine preserved nematodes • identify them. • Perform faecal flotation and identify eggs. • Conduct McMaster Technique faecal egg count. • Set up larval cultures and identify L3 larvae. • Carry out GIT post-mortem and recover nematodes. • Identify lungworms in tracheal/lung samples.	Preserved cestodes, microscopes, Hand lens Faecal samples, McMaster slides, saturated NaCl flotation solution. Petri dishes, PPE.

				trans-tracheal wash or post-mortem of trachea/lungs.		
GENERAL OBJECTIVE 4.0: Know the morphology, life cycle, pathology and control of nematodes (roundworms)						
6 -7	4.1 Describe the general morphology of nematodes (cuticle, alimentary canal, reproductive organs, and sexual dimorphism). 4.2 Describe the life cycle and pathology of major gastro-intestinal nematodes of ruminants (<i>Haemonchus contortus</i>, <i>Trichostrongylus</i>, <i>Ostertagia</i>, <i>Cooperia</i>, <i>Oesophagostomum</i>, <i>Bunostomum</i>). 4.3 Explain Preserved nematodes, microscopes, Hand lens, slides. 4.4 Describe lungworms (<i>Dictyocaulus filaria</i>, <i>D. viviparus</i>, <i>Metastrongylus apri</i>). 4.5 Describe tissue and skin nematodes (<i>Onchocerca</i>, <i>Stephanofilaria</i>, <i>Setaria</i>, <i>Habronema</i>). 4.6 Explain the pathology	• Explain the general morphology of nematodes (cuticle, alimentary canal, reproductive organs, and sexual dimorphism) • Explain the life cycle and pathology of major gastro-intestinal nematodes of ruminants (<i>Haemonchus contortus</i>, <i>Trichostrongylus</i>, <i>Ostertagia</i>, <i>Cooperia</i>, <i>Oesophagostomum</i>, <i>Bunostomum</i>). • Discuss Preserved nematodes, microscopes, Hand lens, slides, etc. • Describe lungworms (<i>Dictyocaulus filaria</i>, <i>D. viviparus</i>, <i>Metastrongylus apri</i>). • Describe tissue and skin nematodes (<i>Onchocerca</i>, <i>Stephanofilaria</i>, <i>Setaria</i>, <i>Habronema</i>). • Explain the pathology and clinical signs of major	Charts. Projector, whiteboard, markers. Text books, internet. Lecture notes.	• Examine preserved adult nematodes (<i>Haemonchus</i>, <i>Ascaris</i>, <i>Dictyocaulus</i>) • Identify diagnostic features. • Perform faecal flotation • Identify nematode eggs. • Conduct McMaster faecal egg counts (FEC). • Set up coproculture • Identify L3 larvae of trichostrongyles • Conduct post-mortem of GIT to recover	Guide students to: • Examine preserved adult nematodes (<i>Haemonchus</i>, <i>Ascaris</i>, <i>Dictyocaulus</i>) • Identify diagnostic features. • Perform faecal flotation • Identify nematode eggs. • Conduct McMaster faecal egg counts (FEC). • Set up coproculture • Identify L3 larvae of trichostrongyles. • Conduct post-mortem of GIT to recover • Identify nematodes. • Identify lungworms by trans-tracheal wash or post-mortem of	Preserved nematodes, microscopes, Hand lens, slides. Faecal samples, McMaster slides, saturated NaCl flotation solution. Petri dishes, distilled water (for larval cultures). Post-mortem kits, ruminant GIT samples, from abattoir Trachea/lung samples, PPE.

	and clinical signs of major nematode infections, including parasitic gastro-enteritis (PGE) and haemonchosis. 4.7 Outline strategic control of nematodes (anthelmintics, pasture management, targeted-selective treatment).	nematode infections, including parasitic gastro-enteritis (PGE) and haemonchosis. • Explain strategic control of nematodes (anthelmintics, pasture management, targeted-selective treatment).		• Identify nematodes. • Identify lungworms by trans-tracheal wash or post-mortem of trachea/lungs.	trachea/lungs.	
General Objective 5.0 Understand the classification, life cycle, pathology and control of protozoan parasites of farm animals.						
8	5.1 Explain the general features of protozoa and their classification (Mastigophora, Sarcodina, Apicomplexa, Ciliophora) 5.2 Describe blood and tissue protozoa: Trypanosoma (<i>T. vivax</i> , <i>T. congolense</i> , <i>T. brucei</i>), Babesia and Theileria, including Anaplasma 5.3 Describe enteric protozoa: Eimeria spp. (coccidiosis), Cryptosporidium parvum, Giardia, Histomonas meleagridis	• Describe the general features of protozoa and their classification (Mastigophora, Sarcodina, Apicomplexa, Ciliophora) • Discuss blood and tissue protozoa: Trypanosoma (<i>T. vivax</i>, <i>T. congolense</i>, <i>T. brucei</i>), Babesia and Theileria, including Anaplasma • Describe enteric protozoa: Eimeria spp. (coccidiosis), Cryptosporidium parvum, Giardia, Histomonas meleagridis (blackhead in turkeys), Balantidium. • Discuss Toxoplasma gondii and its life cycle in cats, livestock and	Charts. Projector, whiteboard, markers. Text books, internet. Note books	• Prepare blood smears. • Examine blood smears • Stain blood smears with Giemsa stain • Identify Trypanosoma, Babesia and Theileria under the microscope. • Perform faecal flotation for coccidial oocysts and modified Ziehl–Neelsen	Guide the students to: • Prepare blood smears. • Examine blood smears • Stain blood smears with Giemsa stain • Identify Trypanosoma, Babesia and Theileria under the microscope. • Perform faecal flotation for coccidial oocysts and modified Ziehl–Neelsen staining for Cryptosporidium.	Microscopes, slides, cover-slips, immersion oil. Giemsa stain, methanol, phosphate buffer. Modified Ziehl–Neelsen reagents. Faecal samples, flotation solution. 2.5% potassium dichromate, Petri dishes, PPE.

	(blackhead in turkeys), <i>Balantidium</i>. 5.4 Describe <i>Toxoplasma gondii</i> and its life cycle in cats, livestock and humans. 5.5 Explain the pathology, clinical signs and prevention/control of major protozoan diseases (trypanosomosis, babesiosis, coccidiosis, toxoplasmosis).	humans. Describe the pathology, clinical signs and prevention/control of major protozoan diseases (trypanosomosis, babesiosis, coccidiosis, toxoplasmosis).		staining for <i>Cryptosporidium</i>. Sporulate <i>Eimeria</i> oocysts in 2.5% potassium dichromate Identify species by morphology.	Sporulate <i>Eimeria</i> oocysts in 2.5% potassium dichromate Identify species by morphology.	
General Objective 6.0: Know the biology, economic importance and control of insect parasites (lice, fleas, flies) of livestock						
9	6.1 Describe the general morphology and biology of insects of veterinary importance. 6.2 Describe lice of livestock and poultry. 6.3 Describe fleas and their roles as vectors. 6.4 Describe biting flies 6.5 Describe non-biting flies and myiasis. 6.6 Explain the economic importance of insect parasites 6.7 Outline integrated control measures.	- Discuss morphology and biology of insect of veterinary importance. - Explain lice of livestock and poultry. - Discuss fleas and their roles as vectors. - Discuss biting flies. - Explain non-biting flies and myiasis. - Explain the economic importance of insect parasites - Describe integrated control measures.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	- Identify common insect parasites of livestock under hand-lens and microscope. - Collect insect specimens - Mount insect specimens - Preserve insect specimens. - Examine live animals at the	Guide students to: - Identify common insect parasites of livestock under hand-lens and microscope. - Collect insect specimens - Mount insect specimens - Preserve insect specimens. - Examine live animals at the institutional farm to identify lice, flies and myiasis	Hand lenses, stereo microscopes, mounting needles. Insect collection kits (forceps, vials, ethanol). Live animals (cattle, sheep, dogs, poultry). Insecticides, pour-on applicators. NZI / biconical tsetse trap, PPE.

				institutional farm to identify lice, flies and myiasis lesions. • Demonstrate insecticide application and trap deployment	lesions. • Demonstrate insecticide application and trap deployment	
General Objective 7.0: Know the biology, economic importance and control of ticks and mites of livestock and poultry.						
10	7.1 Describe the morphology of ticks. 7.2 List tick species and describe their life cycles. 7.3 List major tick-borne diseases. 7.4 List mites and mange of livestock and poultry. 7.5 Explain integrated control of ticks and mites	• Explain the morphology of ticks. • Describe tick species and life cycles. • Explain major tick-borne diseases. • Describe mites and mange of livestock and poultry. • Discuss integrated control of ticks and mites.	Charts. Projector, Whiteboard, Markers. Textbooks, internet. Note book	• <i>Collect ticks from animals</i> • <i>Preserve them in 70% ethanol.</i> • <i>Identify ticks to genus and species using a stereo microscope and identification keys.</i> • Perform skin scrapings and identify mange mites. • Demonstrate acaricide application.	Guide students to: • <i>Collect ticks from animals</i> • <i>Preserve them in 70% ethanol.</i> • <i>Identify ticks to genus and species using a stereo microscope and identification keys.</i> • Perform skin scrapings and identify mange mites. • Demonstrate acaricide application. • Inspect poultry houses for ectoparasite.	Acaricide EC Acaricide powder Knapsack sprayer Pour on Microscope Stereo microscope

				Inspect poultry houses for ectoparasite.		
GENERAL OBJECTIVE 8.0: Know the biology, economic importance and control of ticks and mites of livestock and poultry.						
11-12	8.1 Describe the procedures for collection, labelling, packaging and transport of parasitological samples (faeces, blood, skin scrapings, ectoparasites, tissues). 8.2 Explain direct smear, sedimentation, simple flotation and centrifugal flotation techniques.	- Explain the procedures for collection, labelling, packaging and transport of parasitological samples (faeces, blood, skin scrapings, ectoparasites, tissues). - Explain direct smear, sedimentation, simple flotation and centrifugal flotation techniques.	Charts. Projector, whiteboard, markers. Textbooks, internet.	- Collect parasitological samples (faeces, blood, skin scrapings) - Label parasitological samples - Package parasitological	Guide student to : - Collect parasitological samples (faeces, blood, skin scrapings) - Label parasitological samples - Package parasitological	Sample bottles, slides, cover-slips, microscopes. McMaster slides, flotation/sedimentation reagents. Baermann apparatus, beakers, funnels, sieves. Giemsa and Ziehl–Neelsen stains,

	8.3 Describe the McMaster and modified McMaster techniques for faecal egg count (FEC) and the Faecal Egg Count Reduction Test (FECRT). 8.4 Explain the Baermann technique for larvae and faecal cultures (coproculture). 8.5 Explain staining methods (Giemsa for blood parasites; modified Ziehl–Neelsen for <i>Cryptosporidium</i>). 8.6 Outline the principles of modern molecular and immunological diagnostics (PCR, ELISA, copro-antigen tests) and digital tools (smartphone-based egg-count apps such as FECPAK G2 and Telenostic).	• Describe the McMaster and modified McMaster techniques for faecal egg count (FEC) and the Faecal Egg Count Reduction Test (FECRT). • Discuss the Baermann technique for larvae and faecal cultures (coproculture). • Explain staining methods (Giemsa for blood parasites; modified Ziehl–Neelsen for <i>Cryptosporidium</i>). • Discuss the principles of modern molecular and immunological diagnostics (PCR, ELISA, copro-antigen tests) and digital tools (smartphone-based egg-count apps such as FECPAK G2 and Telenostic).		l samples. • Perform direct smear, sedimentation and flotation techniques on faecal samples. • Carry out McMaster and modified McMaster faecal egg counts. • Set up Baermann apparatus for larval recovery. • Prepare and stain blood smears with Giemsa, and faecal smears with modified Ziehl–Neelsen. • Use a smartphone-based faecal egg-count application	samples. • Perform direct smear, sedimentation and flotation techniques on faecal samples. • Carry out McMaster and modified McMaster faecal egg counts. • Set up Baermann apparatus for larval recovery. • Prepare and stain blood smears with Giemsa, and faecal smears with modified Ziehl–Neelsen. • Use a smartphone-based faecal egg-count application (e.g., FECPAK G2, Telenostic,	methanol. Smartphone, FECPAK
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				(e.g., FECPAK G2, Telenostic,		
GENERAL OBJECTIVE 9.0: Understand integrated parasite management, anthelmintic resistance, climate-smart parasite control and zoonotic parasites						
13-15	9.1 Explain integrated parasite management (IPM) 9.2 Highlight its principles. 9.3 List major classes of anthelmintics (benzimidazoles, imidazothiazoles/levamisole, macrocyclic lactones / ivermectin, salicylanilides, isoquinolones / praziquantel). 9.4 Outline anthelmintic resistance: mechanisms, detection (FECRT, larval development assay) and management (refugia-based dosing, targeted-selective treatment). 9.5 Explain non-chemotherapeutic control: pasture rotation, biological control (Duddingtonia flagrans), tannin-rich forages (sericea lespedeza),	- Describe integrated parasite management (IPM) - Highlight its principles. - Describe major classes of anthelmintics (benzimidazoles, imidazothiazoles/levamisole, macrocyclic lactones / ivermectin, salicylanilides, isoquinolones / praziquantel). - Discuss anthelmintic resistance: mechanisms, detection (FECRT, larval development assay) and management (refugia-based dosing, targeted-selective treatment). - Describe non-chemotherapeutic control: pasture rotation, biological control (Duddingtonia flagrans), tannin-rich forages (sericea lespedeza), breed selection.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	- Conduct FAMACHA© scoring - Record outcomes. - Calculate FECRT from given data. - Demonstrate correct anthelmintic dosing. - Develop a year-round parasite control plan. - Use a digital herd-health record-keeping app or spreadsheet.	Guide students to: - Conduct FAMACHA© scoring - Record outcomes. - Calculate FECRT from given data. - Demonstrate correct anthelmintic dosing. - Develop a year-round parasite control plan. - Use a digital herd-health record-keeping app or spreadsheet.	FAMACHA© cards. Drench guns, anthelmintic samples, weighing scale. Goats / sheep, recording sheets. Computer / tablet, herd-health app or Excel template. Calculator, projector, PPE.

	breed selection. 9.6 Explain the impact of climate change on parasite epidemiology and the principles of climate-smart parasite control. 9.7 Explain zoonotic parasites (<i>Toxoplasma</i>, <i>Echinococcus</i>, <i>Taenia solium</i>, <i>Cryptosporidium</i>, <i>Trypanosoma brucei rhodesiense</i>, <i>Toxocara</i>, <i>Fasciola</i>) under the One-Health framework. 9.8 Explain digital tools for parasite monitoring and herd-health record-keeping (mobile apps, herd-health dashboards, SMS-based extension).	• Describe the impact of climate variability on parasite epidemiology and the principles of climate-smart parasite control. • Describe zoonotic parasites (<i>Toxoplasma</i>, <i>Echinococcus</i>, <i>Taenia solium</i>, <i>Cryptosporidium</i>, <i>Trypanosoma brucei rhodesiense</i>, <i>Toxocara</i>, <i>Fasciola</i>) under the One-Health framework. • Describe digital tools for parasite monitoring and herd-health record-keeping (mobile apps, herd-health dashboards, SMS-based extension).				
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COURSE ASSESSMENT:

Course Work: 10%

Test/Assignments: 10%

Practical: 40%

Examination: 40%

Total: 100%

LABORATORY ANIMAL STUDIES

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: LABORATORY ANIMAL STUDIES	COURSE CODE: VLT 113	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 1 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in managing laboratory animals.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand the concept and rationale of using animals in the laboratory. 2.0 Know common laboratory animal species and their characteristics. 3.0 Know how to manage and house common laboratory animals. 4.0 Know common signs of distress and disease in laboratory animals. 5.0 Apply ethical and regulatory frameworks (3Rs, IACUC, ARRIVE) in laboratory-animal use. 6.0 Apply identification, sex determination and record-keeping for laboratory animals. 7.0 Apply basic nutrition and welfare practices. 8.0 Apply zoonotic risk awareness and biosafety. 9.0 Apply euthanasia, anaesthesia and disposal principles.		

PROGRAMME: NATIONAL DIPLOMA VETERINARY LABORATORY TECHNOLOGY**COURSE TITLE: LABORATORY ANIMAL STUDIES****COURSE CODE: VLT 113****CONTACT HOURS: 2 HOURS/WEEK****CREDIT UNIT: 2****THEORETICAL: 1 HOUR/WEEK****YEAR: I SEMESTER: I****PRE-REQUISITE: NIL****PRACTICAL: 1 HOURS/WEEK****COURSE SPECIFICATION: THEORETICAL AND PRACTICAL****GOAL: This course is designed to equip students with knowledge and skills in managing laboratory animals.****General Objective 1.0:** Understand the concept and rationale of using animals in the laboratory.

THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1-2	1.1 Define laboratory animals and laboratory animal science. 1.2 Explain the historical development of animal use in research and teaching. 1.3 Describe the scientific importance of animal models in biomedical research. 1.4 Describe advantages and limitations of animal experimentation. 1.5 Explain the principles of humane animal use in research, testing, and teaching.	• Explain laboratory animals and laboratory animal science. • Discuss the historical development of animal use in research and teaching. • Describe the scientific importance of animal models in biomedical research. • Explain advantages and limitations of animal experimentation. • Explain the principles of humane animal use in research, testing, and teaching.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Identify different laboratory animal species. • Review of case studies involving animal experimentation.	Guide students to: • Identify different laboratory animal species. • Review of case studies involving animal experimentation.	Multimedia presentation, Videos, Laboratory animal science manuals, Research articles and case studies Institutional policy documents

General Objective 2.0: Know common laboratory animal species and their characteristics

2-3	2.1 Outline common laboratory animal species. 2.2 Distinguish between mice, rats, guinea pigs, rabbits, hamsters, and non-human primates. 2.3 Describe anatomical and physiological characteristics of common laboratory animals. 2.4 Explain behavioral characteristics important for animal handling and welfare. 2.5 Select appropriate animal species for specific research purposes	• Describe common laboratory animal species. • Distinguish between mice, rats, guinea pigs, rabbits, hamsters, and non-human primates. • Discuss anatomical and physiological characteristics of common laboratory animals. • Explain behavioral characteristics important for animal handling and welfare.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Identify laboratory animal species. • Observe species-specific characteristics. • Identify breed and strain. • Select appropriate animal species for specific research purposes.	Guide students to: • Identify laboratory animal species. • Observe species-specific characteristics. • Identify breed and strain. • Select appropriate animal species for specific research purposes.	Mice, Rats , Guinea pigs, Rabbits , Hamsters Species, identification charts, Animal atlas/posters, Anatomical models, Weighing balance
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General Objective 3.0: Know how to manage and house common laboratory animals

4 - 5	3.1 Describe housing requirements for different laboratory animal species. 3.2 Explain environmental factors affecting animal health and productivity. 3.3 Explain cage management and sanitation procedures. 3.4 Explain environmental enrichment strategies. 3.5 Describe breeding and colony management practices.	• Discuss housing requirements for different laboratory animal species. • Describe environmental factors affecting animal health and productivity. • Explain cage management and sanitation procedures. • Discuss environmental enrichment strategies. • Describe breeding and colony management practices.	Charts. Projector white board, Marker Text books, Internet, Lecture note,etc.	• Carry out preparation and arrangement Cage. • Monitor Animal environment (temperature, humidity, lighting). • Carry out selection and replacement of Bedding. • Demonstrate enrichment materials and housing systems.	Guide students to: • Carry out preparation and arrangement Cage. • Monitor Animal environment (temperature, humidity, lighting). • Carry out selection and replacement of Bedding. • Demonstrate enrichment materials and housing systems.	Animal cages and racks, Bedding materials (wood shavings, corn cob), Feeders and water bottles, Thermometer, Hygrometer, Cleaning agents and disinfectants Environmental, enrichment devices, PPE
GENERAL OBJECTIVE 4.0: Know common signs of distress and disease in laboratory animals						
	4.1 Explain animal behavior and appearance. 4.2 Describe behavioral signs of pain, stress, and distress. 4.3 Explain common clinical signs of disease. 4.4 Explain factors	• Explain animal behavior and appearance. • Describe behavioral signs of pain, stress, and distress. • Explain common clinical signs of disease. • Explain factors	Charts. Projector, whiteboard, markers. Text books, internet. Lecture notes.	• Assess animal's health in laboratory. • Observe abnormal behaviors. • Score body condition. • Demonstrate clinical	Guide students to: • Assess animal's health in laboratory. • Observe abnormal behaviors. • Score body condition. • Demonstrate clinical examination. • Interpretate health-monitoring records.	Healthy and affected laboratory animals, Health monitoring charts, Clinical examination forms, Animal restraint devices, Digital

6 -7	predisposing animals to disease. 4.5 Describe appropriate reporting and intervention procedures.	predisposing animals to disease. Describe appropriate reporting and intervention procedures.		examination. - Interpretate health-monitoring records. - Case studies on common diseases and welfare concerns.	Case studies on common diseases and welfare concerns.	thermometer, Stethoscope (where applicable), Veterinary diagnostic images/videos
General Objective 5.0 Apply ethical and regulatory frameworks (3Rs, IACUC, ARRIVE) in laboratory-animal use						
8	5.1 Explain the principles of Replacement, Reduction, and Refinement (3Rs). 5.2 Describe the functions of Institutional Animal Care and Use Committees (IACUCs). 5.3 Explain the ARRIVE guidelines for animal research reporting. 5.4 Explain ethical principles in experimental design. 5.5 Describe animal-use proposals for ethical compliance.	- Explain the principles of Replacement, Reduction, and Refinement (3Rs). - Discuss the functions of Institutional Animal Care and Use Committees (IACUCs). - Describe the ARRIVE guidelines for animal research reporting. - Explain ethical principles in experimental design. - Explain animal-use proposals for ethical compliance.	Charts. Projector, whiteboard, markers. Text books, internet. Note books	- Identify ethical guidelines and regulations. - Mock IACUC protocol preparation. - Ethical assessment of research proposals. - Apply 3Rs to experimental scenarios. - Evaluate published studies using arrive guidelines.	Guide the students to: - Identify ethical guidelines and regulations. - Mock IACUC protocol preparation. - Ethical assessment of research proposals. - Apply 3Rs to experimental scenarios. - Evaluate published studies using arrive guidelines.	ARRIVE Guidelines documents, Sample animal-use protocols, IACUC application forms, Research ethics manuals , Institutional regulations, National animal welfare legislation
General Objective 6.0: Apply identification, sex determination and record-keeping for laboratory animals						
	6.1 Explain methods used	Discuss methods	Charts.	Determine Sex in	Guide students to:	Laboratory animals,

9	for animal identification. 6.2 Discuss the sex of common laboratory animal species. 6.3 Describe animal records and documentation. 6.4 Explain the importance of traceability in animal research. 6.5 Explain appropriate data-recording techniques.	used for animal identification. • Discuss the sex of common laboratory animal species. • Explain animal records and documentation. • Explain the importance of traceability in animal research. • Discuss appropriate data-recording techniques.	Projector white board, Marker Text books, Internet. Lecture note, etc.	mice, rats, and rabbits. • Demonstrate ear tagging and ear notching techniques. • Use cage cards and animal identification systems. • Record practice using standard forms.	• Determine Sex in mice, rats, and rabbits. • Demonstrate ear tagging and ear notching techniques. • Use cage cards and animal identification systems. • Record practice using standard forms.	Ear tags and applicators, Ear notching equipment, Permanent markers, Cage cards, Animal record books, Computers with record software.
General Objective 7.0: Apply basic nutrition and welfare practices.						
10	7.1 Describe nutritional requirements of common laboratory animals. 7.2 Explain feed formulation and feeding strategies. 7.3 Demonstrate proper feeding and watering procedures. 7.4 Explain welfare-enhancing practices in laboratory animal facilities.	• Describe nutritional requirements of common laboratory animals. • Explain feed formulation and feeding strategies. • Demonstrate proper feeding and watering procedures. • Explain welfare-enhancing practices in laboratory animal facilities.	Charts. Projector, Whiteboard, Markers. Textbooks, internet. Note book	• Carry out identification and evaluation Feed. • Monitor Body weight. • Assess Welfare using welfare checklists. • Develop enrichment and welfare plans. • Evaluate nutritional deficiencies and their effects	Guide students to: • Carry out identification and evaluation Feed. • Monitor Body weight. • Assess Welfare using welfare checklists. • Develop enrichment and welfare plans. • Evaluate nutritional deficiencies and their effects	Commercial laboratory animal feed, Feed samples, Weighing balance, Feeding troughs, Water bottles, Welfare assessment checklists, Body condition score charts, Growth monitoring sheets.

GENERAL OBJECTIVE 8.0: Apply zoonotic risk awareness and biosafety						
11-12	8.1 Define zoonoses and biosafety. 8.2 Outline common zoonotic diseases associated with laboratory animals. 8.3 Explain routes of disease transmission. 8.4 Explain biosafety measures during animal handling and facility operations.	- Describe zoonoses and biosafety. - Explain common zoonotic diseases associated with laboratory animals. - Explain routes of disease transmission. - Explain biosafety measures during animal handling and facility operations.	Charts. Projector, whiteboard, markers. Textbooks, internet.	- Demonstrate PPE selection and usage. - Carry out hand-washing and biosecurity procedures. - Identify hazard exercises. - Carry out animal handling risk assessment activities. - Report spill management and incident drills. - Practice biosafety cabinet orientation.	Guide student to : - Demonstrate PPE selection and usage. - Carry out hand-washing and biosecurity procedures. - Identify hazard exercises. - Carry out animal handling risk assessment activities. - Report spill management and incident drills. - Practice biosafety cabinet orientation.	Laboratory coats, Gloves, Face masks, Face shields/goggles, Hand sanitizers, Handwashing facilities, Biohazard waste bins, Biosafety manuals , Spill kits, First aid box
GENERAL OBJECTIVE 9.0: Apply euthanasia, anaesthesia and disposal principles						
13-15	9.1 Define euthanasia, anaesthesia, and humane endpoints. 9.2 Describe commonly used anaesthetic agents and methods. 9.3 Explain principles of humane euthanasia. 9.4 Explain criteria for	- Describe euthanasia, anaesthesia, and humane endpoints. - Explain commonly used anaesthetic agents and methods. - Describe principles of humane euthanasia.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	- Demonstrate anaesthetic administration techniques. - Monitor anaesthetic depth and recovery. - Observe approved	Guide students to: - Demonstrate anaesthetic administration techniques. - Monitor anaesthetic depth and recovery. - Observe approved euthanasia procedures.	Approved anaesthetic agents, Syringes and needles, Anaesthesia machine/vaporizer (where available), Monitoring equipment

	selecting appropriate euthanasia methods. 9.5 Describe procedures for carcass handling and disposal. 9.6 Describe ethical and regulatory considerations related to euthanasia.	• Explain criteria for selecting appropriate euthanasia methods. • Discuss procedures for carcass handling and disposal. • Discuss ethical and regulatory considerations related to euthanasia.		euthanasia procedures. • Identify humane endpoints from case studies. • Carry out carcass handling and packaging exercises. • Conduct aseptic segregation and disposal procedures. • Carry out Documentation and reporting of euthanasia activities.	• Identify humane endpoints from case studies. • Carry out carcass handling and packaging exercises. • Conduct aseptic segregation and disposal procedures. • Carry out Documentation and reporting of euthanasia activities.	(thermometer, pulse monitor), Euthanasia chamber/equipment, Carcass disposal bags, Biohazard containers Incinerator or approved disposal facility, Relevant euthanasia guidelines.
COURSE ASSESSMENT: Course Work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

ANIMAL HANDLING AND WELFARE I

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: ANIMAL HANDLING AND WELFARE I	COURSE CODE: VLT 114	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 the knowledge and skills required to safely handle, restrain and collect samples from domestic livestock species and laboratory animals.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand animal welfare principles and frameworks; 2.0 Understand animal behaviour, body language and approach for safe handling; 3.0 Know safe handling and restraint of cattle; 4.0 Comprehend safe handling and restraint of sheep and goats; 5.0 Understand safe handling and restraint of pigs; 6.0 Know safe handling and restraint of poultry, rabbits and rodents; 7.0 Understand species-specific venipuncture and blood-sample collection; 8.0 Understand collection of faecal, urine, milk, skin and swab samples; 9.0 Understand transport welfare, biosecurity and ethical/legal considerations during sampling.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ANIMAL HANDLING AND WELFARE		COURSE CODE: VLT 114		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 the knowledge and skills required to safely handle, restrain and collect samples from domestic livestock species and laboratory animals.						
GENERAL OBJECTIVE 1.0: Understand animal welfare principles and frameworks						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define animal welfare and animal handling. 1.2 Describe the five freedoms (fawc, uk): i. Freedom from hunger and thirst. ii. Freedom from discomfort. ii. Freedom from pain, injury and disease. v. Freedom to express normal behaviour. v. Freedom from fear and distress. 1.4 Describe the five	• Define animal welfare and animal handling. • Describe the five freedoms (fawc, uk): — Freedom from hunger and thirst. — Freedom from discomfort. — Freedom from pain, injury and disease. — Freedom to	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Complete a welfare self-assessment quiz. • Conduct welfare assessment on 5 sample animals at institutional farm using a standard scoring sheet. • Document welfare assessment findings in a register.	• Discuss Complete a welfare self-assessment quiz. • Conduct welfare assessment on 5 sample animals at institutional farm using a standard scoring sheet. • Document welfare assessment findings in a register.	Welfare scoring sheets. Animals. Register. Case studies.

	domains model (Nutrition, environment, health, behaviour, mental state). 1.5 Describe OIE/WOAH Terrestrial Animal Health Code Section 7. 1.6 Explain Nigerian legal framework. 1.7 Explain the laboratory technologist's welfare responsibility 1.8 Describe pre-sampling welfare assessments. 1.9 Describe the 3Rs as they apply to live-animal sampling 1.10 Describe documentation of welfare assessment.	express normal behaviour. — Freedom from fear and distress. • Describe the five domains model (Nutrition, environment, health, behaviour, mental state). • Describe OIE/WOAH Terrestrial Animal Health Code Section 7. • Explain Nigerian legal framework. • Explain the laboratory technologist's welfare responsibility • Describe pre-sampling welfare assessments. • Describe the 3Rs as they apply to live-animal sampling • Describe documentation of welfare assessment.				
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GENERAL OBJECTIVE 2.0: Understand animal behaviour, body language and approach for safe handling.						
2	2.1 Describe flight zone and point of balance concepts (Temple Grandin) 2.2 Describe normal behaviour vs stress response in major species. 2.3 Describe species temperament — cattle (prey, herd), sheep (timid, flock), goats (curious, climber), pigs (intelligent, defensive), poultry (flock, low flight zone), rabbits (prey, fearful), rodents (small, fast). 2.4 Explain approach principles. 2.5 Explain handling environment. 2.6 Describe social behaviour 2.7 Explain stress physiology. 2.8 Describe handler safety.	• Describe flight zone and point of balance concepts (Temple Grandin) • Describe normal behaviour vs stress response in major species. • Describe species temperament — cattle (prey, herd), sheep (timid, flock), goats (curious, climber), pigs (intelligent, defensive), poultry (flock, low flight zone), rabbits (prey, fearful), rodents (small, fast). • Explain approach principles. • Explain handling environment. • Describe social behaviour • Explain stress physiology. • Describe handler	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Observe behaviour of cattle, sheep, goats, pigs and poultry at institutional farm.. • Approach a cow while respecting flight zone and point of balance. • Identify stress signs from photographs/videos of livestock. • Design a sampling environment that minimises stress.	Guide students to: • Observe behaviour of cattle, sheep, goats, pigs and poultry at institutional farm.. • Approach a cow while respecting flight zone and point of balance. • Identify stress signs from photographs/videos of livestock. • Design a sampling environment that minimises stress.	Live animals. Observation sheet. Behaviour photos/videos. Design template.

		safety.				
GENERAL OBJECTIVE 3.0: Know safe handling and restraint of cattle.						
3-4	3.1 Describe cattle handling infrastructure. 3.2 Describe moving cattle 3.3 Describe restraint methods. 3.4 Explain how to apply a halter on cattle. 3.5 Explain tying knots. 3.6 Describe bull handling. 3.7 Describe calf handling. 3.8 Describe downed cow management. 3.9 Explain chemical restraint (only with veterinarian). 3.10 Describe challenges with Nigerian indigenous breeds. 3.11 Describe handler positioning at the chute for blood draw.	• Describe cattle handling infrastructure. • Explain moving cattle • Describe restraint methods. • Explain how to apply a halter on cattle. • Discuss tying knots. • Describe bull handling. • Discuss calf handling. • Describe downed cow management. • Explain chemical restraint (only with veterinarian). • Describe challenges with Nigerian indigenous breeds. • Discuss handler positioning at the chute for blood	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Tie a halter • Tie knots (rope work). • Place halter on a calm cow under supervision. • Move cattle along a race using flight zone principles. • Restrain a cow in crush chute; expose jugular vein for blood draw (do not draw blood at this stage). • Restrain a calf for ear-tagging. • Position tail-vein and jugular blood draw on cattle. • Examine a downed cow (real or simulated) and arrange safe transport.	Guide students to: • Tie a halter • Tie knots (rope work). • Place halter on a calm cow under supervision. • Move cattle along a race using flight zone principles. • Restrain a cow in crush chute; expose jugular vein for blood draw (do not draw blood at this stage). • Restrain a calf for ear-tagging. • Position tail-vein and jugular blood draw on cattle. • Examine a downed cow (real or simulated) and arrange safe transport.	Halter, ropes. Live cattle. Race, crush chute. Ear-tag applicator. Scenario for downed cow.

		draw.				
GENERAL OBJECTIVE 4.0: Comprehend safe handling and restraint of sheep and goats.						
5	4.1 Describe handling small ruminants. 4.2 Explain moving flocks. 4.3 Describe restraint for sheep. 4.4 Explain restraint for goats. 4.5 Explain kid/lamb handling 4.6 Explain ram/buck handling 4.7 Describe FAMACHA scoring. 4.8 Describe FOOT examination. 4.9 Explain Nigerian breeds (WAD, Yankasa, Balami, Uda, Sahel sheep; WAD, Sokoto Red, Kano Brown, Sahel goat) each with handling considerations 4.10 Describe positioning for jugular blood draw on small	• Describe handling small ruminants. • Describe moving flocks. • Describe restraint for sheep. • Explain restraint for goats. • Explain kid/lamb handling • Explain ram/buck handling • Describe FAMACHA scoring. • Describe FOOT examination. • Explain Nigerian breeds (WAD, Yankasa, Balami, Uda, Sahel sheep; WAD, Sokoto Red, Kano Brown, Sahel goat) each with handling considerations • Describe positioning for	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Catch sheep using leg/flank technique. • Place sheep in sitting (rump) position for examination. • Handle goats using neck-and-flank grip. • Lift hoof of sheep and goat for examination. • Conduct FAMACHA scoring on 10 animals. • Position small ruminant for jugular blood draw (practice positioning only). • Handle a kid or lamb safely.	Guide students to: • Catch sheep using leg/flank technique. • Place sheep in sitting (rump) position for examination. • Handle goats using neck-and-flank grip. • Lift hoof of sheep and goat for examination. • Conduct FAMACHA scoring on 10 animals. • Position small ruminant for jugular blood draw (practice positioning only). • Handle a kid or lamb safely.	Small ruminant handling videos. Hoof trimming tools. Live sheep, goats. FAMACHA cards. Hoof tools. Restraint pen.

	ruminants.	jugular blood draw on small ruminants.				
GENERAL OBJECTIVE 5.0: Understand safe handling and restraint of pigs.						
6	5.1 Explain pig behaviour. 5.2 Describe moving pigs. 5.3 Describe restraint methods. 5.4 Explain lifting piglets. 5.5 Explain sow handling during farrowing. 5.6 Explain boar handling. 5.7 Explain sample-collection positions. 5.8 Explain disease risk in handling pigs. 5.9 Explain biosecurity 5.10 Describe ethical considerations.	• Explain pig behaviour. • Describe moving pigs. • Describe restraint methods. • Explain lifting piglets. • Explain sow handling during farrowing. • Explain boar handling. • Explain sample-collection positions. • Explain disease risk in handling pigs. • Explain biosecurity • Describe ethical considerations.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Move pigs using panels (with available pigs or simulation). • Lift piglet by hindlimbs. • Apply pig snare on a pig (with supervisor). • Position a pig for ear-vein blood draw. • Implement biosecurity protocol for pig handling.	Guide students to: • Move pigs using panels (with available pigs or simulation). • Lift piglet by hindlimbs. • Apply pig snare on a pig (with supervisor). • Position a pig for ear-vein blood draw. • Implement biosecurity protocol for pig handling.	Live pigs or simulation. Pig snare. Panels. PPE.
GENERAL OBJECTIVE 6.0: Know safe handling and restraint of poultry, rabbits and rodents.						

7-8	6.1 Explain poultry handling technique (one leg, supportive holding). 6.2 Explain poultry restraint for sampling — wing-back hold, body lock. 6.3 Describe poultry positions for blood draw — wing vein (brachial), jugular vein, medial metatarsal vein. 6.4 Explain day-old chick handling — careful, cupped hand. 6.5 Describe rabbit handling 6.6 Explain Rabbit restraint. 6.7 Describe RABBIT blood-draw positions. 6.8 Describe rodent handling. 6.9 Describe RODENT blood-draw positions. 6.10 Describe species-specific welfare considerations during	• Discuss poultry handling technique (one leg, supportive holding). • Describe poultry restraint for sampling. • Describe poultry positions for blood draw — wing vein (brachial), jugular vein, medial metatarsal vein. • Explain day-old chick handling. • Describe rabbit handling • Explain Rabbit restraint. • Describe RABBIT blood-draw positions. • Describe rodent handling. • Describe RODENT blood-draw positions. • Describe species-specific welfare considerations	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Catch and handle 5 chickens correctly. • Position chicken for wing-vein blood draw. • Handle rabbit correctly; wrap in towel for restraint. • Position rabbit for marginal ear-vein blood draw. • Handle mice, rats, guinea pigs correctly. • Position rodents for tail-vein blood draw.	Catch and handle 5 chickens correctly. Position chicken for wing-vein blood draw. Handle rabbit correctly; wrap in towel for restraint. Position rabbit for marginal ear-vein blood draw. Handle mice, rats, guinea pigs correctly. Position rodents for tail-vein blood draw.	Live poultry, rabbits, rodents. Restraint materials. Towels. PPE.
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	handling and sampling.	during handling and sampling.				
GENERAL OBJECTIVE 7.0: Understand species-specific venipuncture and blood-sample collection.						
9-10	7.1 Explain blood sample. 7.2 Explain collection tubes and additives: - EDTA (lavender) for haematology and molecular. - Heparin (green) for biochemistry, certain tests. - Clot (red) for serology and biochemistry. - Fluoride (grey) for glucose. - Citrate (blue) for coagulation tests. 7.3 Describe anticoagulant effects on tests 7.4 Describe site preparation. 7.5 Explain needle selection. 7.6 Explain venipuncture technique. 7.7 Explain species-specific venipuncture	- Explain blood sample. - Explain collection tubes and additives: - EDTA (lavender) for haematology and molecular. - Heparin (green) for biochemistry, certain tests. - Clot (red) for serology and biochemistry. - Fluoride (grey) for glucose. - Citrate (blue) for coagulation tests. - Describe anticoagulant effects on tests - Describe site preparation. - Explain needle selection. - Explain	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	- Identify 5 different collection tubes by colour. - Insert needle on rubber tube model. - Collect blood from a cow (jugular or tail vein) under direct supervision. - Collect blood from a sheep or goat (jugular). - Collect blood from a rabbit (marginal ear vein). - Collect blood from chicken (wing or brachial vein). - Collect blood from mouse or rat (tail vein). - Prepare samples for transport. - Identify haemolysis in sample.	Guide students to: - Identify 5 different collection tubes by colour. - Insert needle on rubber tube model. - Collect blood from a cow (jugular or tail vein) under direct supervision. - Collect blood from a sheep or goat (jugular). - Collect blood from a rabbit (marginal ear vein). - Collect blood from chicken (wing or brachial vein). - Collect blood from mouse or rat (tail vein). - Prepare samples for transport. - Identify haemolysis in sample.	Collection tubes, needles, syringes. Live animals. Antiseptics. Labels. Transport box, cold pack. PPE.

	sites: - Cattle: jugular, tail (coccygeal), mammary, abdominal. - Sheep/goats: jugular (preferred), cephalic, saphenous. - Pigs: ear vein, jugular, cranial vena cava (large pigs only). - Poultry: wing (brachial) vein, jugular, medial metatarsal. - Rabbits: marginal ear vein, jugular, lateral saphenous. - Mice/rats: lateral tail vein. - Dogs/cats: cephalic, jugular, saphenous. 7.8 Describe sample labelling 7.9 Describe safe transport to laboratory. 7.10 Describe blood	venipuncture technique. - Explain species-specific venipuncture sites: - Cattle: jugular, tail (coccygeal), mammary, abdominal. - Sheep/goats: jugular (preferred), cephalic, saphenous. - Pigs: ear vein, jugular, cranial vena cava (large pigs only). - Poultry: wing (brachial) vein, jugular, medial metatarsal. - Rabbits: marginal ear vein, jugular, lateral saphenous. - Mice/rats: lateral tail vein. - Dogs/cats:				
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	volume limits.	cephalic, jugular, saphenous. • Describe sample labelling • Describe safe transport to laboratory. • Describe blood volume limits.				
GENERAL OBJECTIVE 8.0: Understand collection of faecal, urine, milk, skin and swab samples.						
11-12	8.1 Explain faecal sample collection: - Direct. - Voided (fresh). - Per cloaca - Cloacal swab. - Drop traps 8.2 Describe faecal handling 8.3 Explain urine sample collection: - Free-catch (mid-stream) - Catheterisation. - Cystocentesis (veterinarian). - Manual expression. - Metabolic cage. 8.4 Explain milk sample	• Describe faecal sample collection: — Direct. — Voided (fresh). — Per cloaca — Cloacal swab. — Drop traps • Explain faecal handling • Discuss urine sample collection: — Free-catch (mid-stream) — Catheterisation. — Cystocentesis (veterinarian). — Manual expression. — Metabolic cage.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Collect faecal sample directly from cow (rectal). • Collect voided faecal samples from sheep, goats, pigs, poultry. • Collect free-catch urine from a cat or dog (or small ruminant). • Collect milk sample aseptically from a cow. • Conduct skin scraping for ectoparasite identification. • Collect bacterial swab from nasal cavity of an animal. • Conduct California Mastitis Test (CMT)	Guide students to: • Collect faecal sample directly from cow (rectal). • Collect voided faecal samples from sheep, goats, pigs, poultry. • Collect free-catch urine from a cat or dog (or small ruminant). • Collect milk sample aseptically from a cow. • Conduct skin scraping for ectoparasite identification. • Collect bacterial	Live animals. Sample containers, swabs. Skin scraping tools. CMT kit. Cold-chain materials. Labels. PPE.

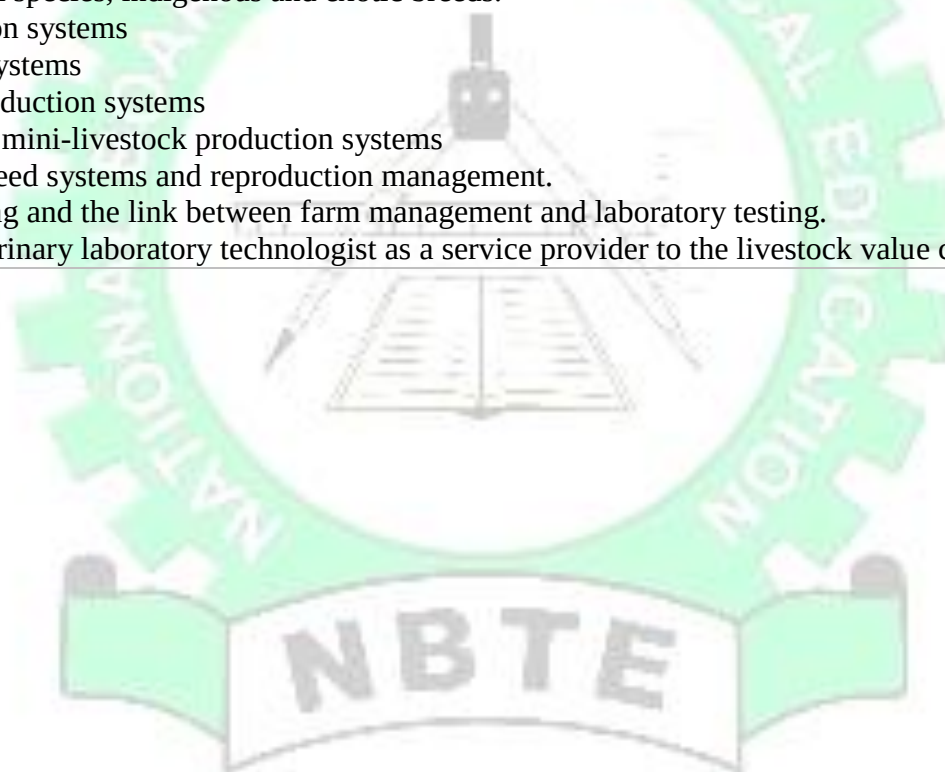
collection: - Hygienic udder preparation. - Discard first 3 streams. - Aseptic collection into sterile tube. - Whole milk vs individual quarter. - Cold transport 8.5 Explain skin sample collection: - Skin scraping (mites) — scalpel to capillary bleeding. - Skin biopsy (punch) — veterinarian. - Hair pluck (dermatophytes). - Tape strip. 8.6 Describe SWAB types and uses: - Bacterial transport swab - Viral transport medium (VTM) swab. - Sterile saline-moistened swab. 8.7 Explain swab sites 8.8 Explain Biopsy (under veterinarian)	- Describe milk sample collection: - Hygienic udder preparation. - Discard first 3 streams. - Aseptic collection into sterile tube. - Whole milk vs individual quarter. - Cold transport - Explain skin sample collection: - Skin scraping (mites) — scalpel to capillary bleeding. - Skin biopsy (punch) — veterinarian. - Hair pluck (dermatophytes). - Tape strip. - Discuss SWAB types and uses: - Bacterial transport swab - Viral transport		on a milking cow. - Handle all samples appropriately. - Prepare samples for transport with appropriate cold-chain	swab from nasal cavity of an animal. - Conduct California Mastitis Test (CMT) on a milking cow. - Handle all samples appropriately. - Prepare samples for transport with appropriate cold-chain	
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	8.9 Describe semen sample collection (artificial vagina, electroejaculation) 8.10 Explain mastitis-specific sampling using California Mastitis Test (CMT) kit	medium (VTM) swab. — Sterile saline-moistened swab. • Explain swab sites • Explain Biopsy (under veterinarian) • Discuss semen sample collection (artificial vagina, electroejaculation) • Describe mastitis-specific sampling using California Mastitis Test (CMT) kit				
GENERAL OBJECTIVE 9.0: Understand transport welfare, biosecurity and ethical/legal considerations during sampling.						
14-15	9.1 Explain transport welfare. 9.2 Describe species-specific transport. 9.3 Explain transport-related illness Explain biosecurity during sampling Explain hand hygiene 9.4 Describe sharps handling 9.5 Describe needle-stick	• Describe transport welfare. • Explain species-specific transport. • Describe transport-related illness Explain biosecurity during sampling Discuss hand hygiene • Describe sharps handling	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Conduct fitness-for-transport assessment on 5 animals. • Implement biosecurity protocol when entering a farm for sampling. • Dispose of sharps and biohazard waste correctly. • Simulate needle-stick first-aid response. • Complete a chain-of-	Guide students to: • Conduct fitness-for-transport assessment on 5 animals. • Implement biosecurity protocol when entering a farm for sampling. • Dispose of sharps and biohazard waste correctly. • Simulate needle-stick	Animals. Biosecurity supplies. Sharps container. First-aid kit. Chain-of-custody form. Examination rubric.

	injury immediate first aid, report to supervisor, post-exposure management. 9.6 Explain zoonotic risk awareness during sampling. 9.7 Explain documentation of sampling. 9.8 Explain ethical considerations 9.9 Explain legal considerations 9.10 Describe forensic sample collection.	• Discuss needle-stick injury immediate first aid, report to supervisor, post-exposure management. • Discuss zoonotic risk awareness during sampling. • Explain documentation of sampling. • Describe ethical considerations • Describe legal considerations • Explain forensic sample collection.		custody form for samples.	first-aid response. • Complete a chain-of-custody form for samples.	
COURSE ASSESSMENT: Course Work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

LIVESTOCK PRODUCTION SYSTEMS

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: LIVESTOCK PRODUCTION SYSTEMS	COURSE CODE: VLT 115	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 the knowledge and skills of Nigerian livestock production systems and value chain.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand the Nigerian livestock sector 2.0 Know major Nigerian livestock species, indigenous and exotic breeds. 3.0 Understand livestock production systems 4.0 Understand cattle production systems 5.0 Understand small ruminant production systems 6.0 Understand poultry, swine and mini-livestock production systems 7.0 Understand farm biosecurity, feed systems and reproduction management. 8.0 Understand farm record-keeping and the link between farm management and laboratory testing. 9.0 Understand the role of the veterinary laboratory technologist as a service provider to the livestock value chain.		



PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: LIVESTOCK PRODUCTION SYSTEMS			COURSE CODE: VLT 115	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 the knowledge and skills of Nigerian livestock production systems and value chain.						
GENERAL OBJECTIVE 1.0: Understand the Nigerian livestock sector						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Explain livestock population. 1.2 Explain economic contribution of livestock to Nigerian Economy. 1.3 Describe nutritional contribution of livestock. 1.4 Describe cultural and Social significance of livestock. 1.5 Describe ecological zones of Nigeria and their livestock systems. 1.6 Explain policy framework. 1.7 Explain Major Livestock Challenges in Nigeria 1.8 Explain the role of veterinary laboratory in addressing the above challenges.	• Discuss livestock population. • Discuss economic contribution of livestock to Nigerian Economy. • Explain nutritional contribution of livestock • Discuss cultural and Social significance of livestock. • Explain ecological zones of Nigeria and their livestock systems • Explain policy framework. • Discuss Major Livestock Challenges in Nigeria • Discuss the role of veterinary laboratory in	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.			

		addressing the above challenges.				
GENERAL OBJECTIVE 2.0: Know major Nigerian livestock species, indigenous and exotic breeds						
2-3	2.1 Describe cattle breeds: - Indigenous - Exotic/Crossbreed - Dual purpose breeds 2.2 Describe sheep breeds: - Yankasa, 2.3 Explain goat breeds: - West African Dwarf, - Small, - Humid south, - Prolific. - Sokoto red - Famous skin - Kano Brown 2.4 Describe pig breeds, - Indigenous Nigerian pig, - Exotic 2.5 Describe poultry breeds: - Native chicken - Layers - Broilers - Dual-purpose: - Turkey, - Guinea fowl, - Ducks, - Quails. 2.5 Describe mini-livestock species: rabbits, snails,	- Describe cattle breeds: - Indigenous - Exotic/Crossbreed - Dual purpose breeds - Describe sheep breeds: - Yankasa, - Explain goat breeds: - West African Dwarf, - Small, - Humid south, - Prolific. - Sokoto red - Famous skin - Kano Brown - Describe pig breeds, - Indigenous Nigerian pig, - Exotic - Describe poultry breeds: - Native chicken - Layers - Broilers - Dual-purpose: - Turkey, - Guinea fowl, - Ducks, - Quails. - Describe mini-livestock	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	- Visit institutional farm - Identify available breeds. - Visit a livestock market - Identify breeds - Assess their conditions. - Take photographs of 10 different breeds - Create personal breed atlas. - Develop a breed-identification chart for your home region.	Guide students to: - Visit institutional farm - Identify available breeds. - Visit a livestock market - Identify breeds - Assess their conditions. - Take photographs of 10 different breeds - Create personal breed atlas. Develop a breed-identification chart for your home region	Live animals Camera Smartphone Atlas template Chart template

	etc. 2.6 Describe breed identification (characteristics, colour, conformation, size) 2.7 Explain breed conservation.	species: rabbits, snails, etc. • Describe breed identification (characteristics, colour, conformation, size) • Explain breed conservation.				
GENERAL OBJECTIVE 3.0: Understand livestock production systems						
4	3.1 Describe extensive system, 3.2 Describe semi-intensive system. 3.3 Explain intensive system, 3.4 Describe agro-forestry-livestock 3.5 Describe traditional pastoralism in Nigeria. 3.6 Describe commercial livestock. 3.7 Explain comparison of systems 3.8 Describe implications for laboratory support 3.9 Explain transition trends	• Explain extensive system, • Discuss semi-intensive system. • Describe intensive system, • Describe agro-forestry-livestock • Discuss traditional pastoralism in Nigeria. • Explain commercial livestock. • Describe comparison of systems • Explain implications for laboratory support • Describe transition trends	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Visit a pastoralist herd (extensive). • Visit commercial farms (intensive). • Visit a smallholder mixed farm (semi-intensive). • Develop a comparison matrix of 3 systems on 10 dimensions	Guide students to: • Visit a pastoralist herd (extensive). • Visit commercial farms (intensive). • Visit a smallholder mixed farm (semi-intensive). • Develop a comparison matrix of 3 systems on 10 dimensions	Comparison matrix template
GENERAL OBJECTIVE 4.0: Understand cattle production systems						
5	4.1 Describe dairy cattle 4.2 Describe beef cattle production	• Describe dairy cattle • Describe beef cattle production	Charts. Projector white board,	• Visit a commercial dairy farm. • Visit fattening	Guide students to: • Visit a commercial dairy	Research data Disease list

4.3 Describe dual-purpose systems 4.4 Describe nutritional requirements of dairy and beef. 4.5 Describe lactation cycle and milking management. 4.6 Describe fattening cycle. 4.7 Describe breeding management 4.8 Explain some major diseases of Nigerian cattle: - Brucellosis (zoonotic, abortion). - Foot-and-mouth disease. - Trypanosomiasis (vector-borne). -CBPP - LSD -Dermatophliosis - Bovine TB (zoonotic). - Mastitis. - Internal parasites. - Tick-borne (heartwater, babesiosis). 4.9 Discuss COMMON DIAGNOSTIC tests laboratory provides to cattle farmers	- Describe dual-purpose systems - Describe nutritional requirements of dairy and beef. - Describe lactation cycle and milking management. - Describe fattening cycle. - Describe breeding management - Explain some major diseases of Nigerian cattle: —Brucellosis (zoonotic, abortion). —Foot-and-mouth disease. —Trypanosomiasis (vector-borne). —CBPP —LSD —Dermatophliosis —Bovine TB (zoonotic). —Mastitis. —Internal parasites. —Tick-borne (heartwater, babesiosis). - Discuss COMMON DIAGNOSTIC tests laboratory provides to	Marker Text books, Internet. Lecture note,etc.	operation. - Identify the 10 most common cattle diseases requiring laboratory support in Nigeria. - Design a routine herd-health laboratory testing programme.	farm. - Visit fattening operation. - Identify the 10 most common cattle diseases requiring laboratory support in Nigeria. - Design a routine herd-health laboratory testing programme.	Programme template Live animals Diagnostic kits
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		cattle farmers				
GENERAL OBJECTIVE 5.0: Understand small ruminant production systems						
6	5.1 Describe small ruminant role in Nigerian livelihoods 5.2 Describe production systems for sheep and goats 5.3 Describe sheep production 5.4 Describe goat production 5.5 Describe dairy goat emerging market in Nigeria. 5.6 Describe flock management 5.7 Describe major diseases of small ruminants: - PPR (Peste des Petits Ruminants) - Haemorrhagic septicaemia - Orf and goat pox - Helminthiasis (especially Haemonchus) — most production-limiting. - CCPP (Contagious Caprine Pleuropneumonia). - Foot rot.	- Describe small ruminant role in Nigerian livelihoods - Describe production systems for sheep and goats - Describe sheep production - Describe goat production - Describe dairy goat emerging market in Nigeria. - Describe flock management - Describe major diseases of small ruminants: - PPR (Peste des Petits Ruminants). - Haemorrhagic septicaemia - Orf and goat pox - Helminthiasis (especially Haemonchus) - CCPP (Contagious Caprine Pleuropneumonia).	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	- Visit a small ruminant farm or pastoralist flock. - Observe lambing/kidding management. - Visit small ruminant markets. - Identify lab tests appropriate for small ruminant surveillance. - Design a routine flock health calendar.	Guide students to: - Visit a small ruminant farm or pastoralist flock. - Observe lambing/kidding management. - Visit small ruminant markets. - Identify lab tests appropriate for small ruminant surveillance. - Design a routine flock health calendar.	Flock access Research data Calendar template Personal Protective Equipment Production system diagrams

	vii. Mastitis. viii. Heartwater. ix. Pneumonia. 5.8 Describe lab tests commonly required for small ruminants 5.9 Describe cooperative production models for smallholders.	— Foot rot. — Mastitis. — Heartwater. — Pneumonia. • Describe lab tests commonly required for small ruminants • Describe cooperative production models for smallholders.				
GENERAL OBJECTIVE 6.0: Understand poultry, swine and mini-livestock production systems						
7-8	6.1 Explain commercial poultry in Nigeria. 6.2 Describe layer production. 6.3 Explain broiler production. 6.4 Explain backyard poultry. 6.5 Describe hatchery operations. 6.6 Describe poultry diseases of major concern. 6.7 Explain swine production. 6.8 Describe swine diseases. 6.9 Explain mini livestock. 6.10 Explain apiculture. 6.11 Explain lab support to each: poultry, swine mini-livestock.	• Describe commercial poultry in Nigeria. • Explain layer production. • Discuss broiler production. • Discuss backyard poultry. • Explain hatchery operations. • Discuss poultry diseases of major concern. • Describe swine production. • Describe swine diseases. • Discuss mini livestock. • Explain apiculture.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	• Visit a commercial poultry farm (layer or broiler). • Visit a hatchery (if available). • Visit a swine farm or backyard pig operation. • Visit a rabbit, snail or apiculture operation. • Identify the top 5 lab tests required for each subsector. • Research ASF impact on Nigerian pig industry.	Guide students to: • Visit a commercial poultry farm (layer or broiler). • Visit a hatchery (if available). • Visit a swine farm or backyard pig operation. • Visit a rabbit, snail or apiculture operation. • Identify the top 5 lab tests required for each subsector. • Research ASF impact on Nigerian pig	Transport Farm access Research materials Production system diagrams

		Discuss lab support to each: poultry, swine mini-livestock.			industry.	
GENERAL OBJECTIVE 7.0: Understand farm biosecurity, feed systems and reproduction management						
9-10	7.1 Define biosecurity. 7.2 Explain biosecurity principles. 7.3 Describe farm-level bio security practices. 7.4 Describe biosecurity zones. 7.5 Explain feed systems. 7.6 Describe Nigerian feedstuffs. 7.7 Describe feeding programmes. 7.8 Describe feed contamination. 7.9 Describe reproduction management. 7.10 Describe breeding programmes. 7.11 Explain reproductive testing. 7.12 Describe feed testing.	- Explain biosecurity. - Discuss biosecurity principles. - Describe farm-level bio security practices. - Describe biosecurity zones. - Describe feed systems. - Discuss Nigerian feedstuffs. - Discuss feeding programmes. - Describe feed contamination. - Explain reproduction management. - Discuss breeding programmes. - Explain reproductive testing. - Describe feed testing.	Reference textbooks Projector Internet White board Marker	- Identify practical requirements for farm biosecurity, feed systems and reproduction management. - Demonstrate an activity or procedure related to farm biosecurity, feed systems and reproduction management.	Guide students to: - Identify practical requirements for farm biosecurity, feed systems and reproduction management. - Demonstrate an activity or procedure related to farm biosecurity, feed systems and reproduction management.	Biosecurity guidelines Feed samples Artificial insemination equipment samples
GENERAL OBJECTIVE 8.0: Understand farm record-keeping and the link between farm management and laboratory testing						
11	8.1 Highlight the importance of farm records. 8.2 Describe types of farm records	- Discuss the importance of farm records. - Explain types of farm	Charts. Projector white board, Marker	- Review records at the institutional farm. - Identify gaps.	- Review records at the institutional farm; identify gaps. - Design a complete	Institutional farm records Record system

	8.3 Differentiate between manual and digital records. 8.4 Describe records informing testing. 8.5 Describe results informing decisions. 8.6 Describe farm-lab communication. 8.7 Define regulatory records. 8.8 Describe reporting obligations. 8.9 Define KPIs. 8.10 Outline the importance of farm records.	records • Differentiate between manual and digital records. • Explain records informing testing. • Describe results informing decisions. • Discuss farm-lab communication. • Describe regulatory records. • Describe reporting obligations. • Explain KPIs. • Discuss the importance of farm records.	Text books, Internet. Lecture note, etc.	• Design a complete record-keeping system for a smallholder poultry farm. • Link example laboratory results to farm decisions in 5 case. • Develop a notifiable disease reporting flowchart. • Identify 5 KPIs for each major livestock species.	record-keeping system for a smallholder poultry farm. • Link example laboratory results to farm decisions in 5 case studies. • Develop a notifiable disease reporting flowchart. • Identify 5 KPIs for each major livestock species.	template Case study materials Flowchart template management software demos Sample submission forms
GENERAL OBJECTIVE 9.0: Understand the role of the veterinary laboratory technologist as a service provider to the livestock value chain						
12	9.1 Explain livestock value chain. 9.2 Explain laboratory as service provider in livestock value chain 9.3 Describe farm-level services. 9.4 Explain processing-level services. 9.5 Describe regulatory services.	• Describe livestock value chain. • Discuss laboratory as service provider in livestock value chain • Explain farm-level services. • Describe processing-level services. • Describe regulatory	Value chain diagrams Business model templates Reference materials Charts. Projector white board,			

	9.6 Explain mobile/field services. 9.7 Define point-of-care. 9.8 Describe livestock business models. 9.9 Explain client management. 9.10 Describe reporting/interpretation. 9.11 Describe Nigerian opportunities in the livestock sector.	services. •Discuss mobile/field services. •Explain point-of-care. •Describe livestock business models. •Explain client management. •Discuss reporting/interpretation . •Describe Nigerian opportunities in the livestock sector.	Marker Text books, Internet. Lecture note,etc.			
COURSE ASSESSMENT: Course Work: 10% Test/Assignments: 10% Practical: 40% Examination: 40% Total: 100%						

BIOLOGY OF DOMESTIC ANIMALS

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: BIOLOGY OF DOMESTIC ANIMALS	COURSE CODE: VLT 116	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 2 HOURS/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NIL	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip the students with the knowledge and skills of biology in relation to underpinning veterinary laboratory.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand the nature, characteristics and classification of living things; 2.0 Understand the cell as the basic unit of life; 3.0 Understand tissues, organs and organ systems; 4.0 Understand the morphology and physiology of major plant and animal phyla; 5.0 Understand basic animal physiology; 6.0 Understand microorganisms; 7.0 Understand ecology, ecosystems and conservation; 8.0 Understand reproduction, growth, development and genetics; 9.0 Apply basic biological laboratory techniques.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: BIOLOGY OF DOMESTIC ANIMALS			COURSE CODE: VLT 116		CONTACT HOURS: 4 HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 2 HOURS/WEEK	
YEAR: I SEMESTER: I			PRE-REQUISITE: NIL		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip the students with the knowledge and skills of biology in relation to underpinning veterinary laboratory.						
GENERAL OBJECTIVE 1.0: Understand the nature, characteristics and classification of living things						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Explain biology and its branches (zoology, botany, microbiology, genetics, ecology, biochemistry, molecular biology) 1.2 List the characteristics of living things. 1.3 Differentiate between living from non-living 1.4 Explain border cases (viruses). 1.5 Describe the five-kingdom classification (Whittaker) 1.6 Explain the three-domain classification (Bacteria, Archaea, Eukarya).	- Explain biology and its branches (zoology, botany, microbiology, genetics, ecology, biochemistry, molecular biology) - Explain the characteristics of living things. - Differentiate between living from non-living - Discuss border cases (viruses). - Describe the five-kingdom classification (Whittaker) - Explain the three-domain classification (Bacteria, Archaea, Eukarya).	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	- Examine 5 living and 5 non-living items - Record characteristics observed. - Classify 20 sample organisms into kingdoms and phyla. - Write the binomial name for 10 livestock and 10 plant - Construct a taxonomic key for sample organisms.	Guide students to: - Examine 5 living and 5 non-living items - Record characteristics observed. - Classify 20 sample organisms into kingdoms and phyla. - Write the binomial name for 10 livestock and 10 plant - Construct a taxonomic key for sample organisms.	Laboratory access Sample organisms Specimens Classification chart Worksheet templates

	Eukarya). 1.7 Describe taxonomic hierarchy. 1.8 Describe binomial nomenclature (Linnaeus) e.g. <i>Bos taurus</i>, <i>Escherichia coli</i>; italics/underline; capitalisation rules. 1.9 Describe species concept and speciation. 1.10 Explain evolution and natural selection (Darwin) at introductory level	• Describe taxonomic hierarchy. • Discuss binomial nomenclature (Linnaeus) e.g. <i>Bos taurus</i>, <i>Escherichia coli</i>; italics/underline; capitalisation rules. • Discuss species concept and speciation. • Describe evolution and natural selection (Darwin) at introductory level				
GENERAL OBJECTIVE 2.0: Understand the cell as the basic unit of life						
2-3	2.1 Explain the cell theory 2.2 Describe prokaryotic cell structure 2.3 Describe eukaryotic cell structure 2.4 Explain plant-cell specific structures 2.5 Describe animal-cell specific features 2.6 Describe differences between prokaryotes and eukaryotes.	• Describe the cell theory • Explain prokaryotic cell structure • Describe eukaryotic cell structure • Discuss plant-cell specific structures • Discuss animal-cell specific features • Explain differences between prokaryotes and eukaryotes.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Prepare a wet mount of cheek cells; observe under microscope. • Prepare a slide of onion epidermal cells; observe and draw. • Observe prepared slides of various cell types • Demonstrate osmosis using	Guide students to: • Prepare a wet mount of cheek cells; observe under microscope. • Prepare a slide of onion epidermal cells; observe and draw. • Observe prepared slides of various cell types • Demonstrate osmosis using potato cubes in distilled water vs salt	Microscopes Slides Cheek swab Onion Salt Distilled water Potato Prepared slides Drawing materials

				potato cubes in distilled water vs salt solution. • Observe a model demonstration of mitosis stages. • Draw a typical animal cell and plant cell.	solution. • Observe a model demonstration of mitosis stages. • Draw a typical animal cell and plant cell.	
GENERAL OBJECTIVE 3.0: Understand tissues, organs and organ systems						
4	3.1 Define tissue 3.2 Describe animal tissue types: i. Epithelial ii. Connective iii. Muscular iv. Nervous 3.3 Describe plant tissue types 3.4 Define organ 3.5 Explain organ system 3.6 Describe major animal organ systems. 3.7 Describe major plant 3.8 Describe homeostasis	• Explain tissue • Discuss animal tissue types: — Epithelial — Connective — Muscular — Nervous • Describe plant tissue types • Explain organ • Discuss organ system • Describe major animal organ systems. • Describe major plant • Describe homeostasis	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Examine prepared slides of all major animal tissue types. • Examine prepared slides of plant tissues. • Dissect a flower; identify all parts. • Observe a fresh animal organ (e.g. cow heart, kidney from abattoir); • Identify external features. • Construct a chart of organ systems and their functions.	Guide students to: • Examine prepared slides of all major animal tissue types. • Examine prepared slides of plant tissues. • Dissect a flower; identify all parts. • Observe a fresh animal organ (e.g. cow heart, kidney from abattoir); • Identify external features. • Construct a chart of organ systems and their functions.	Prepared slides Microscopes Fresh flowers Fresh organs Including abattoir Dissection tools
GENERAL OBJECTIVE 4.0: Understand the morphology and physiology of major plant and animal phyla						
5-6	4.1 Describe major plant groups 4.2 Describe angiosperms	• Describe major plant groups • Describe angiosperms	Charts. Projector white	• Identify 20 specimens spanning all major	Guide students to: • Identify 20 specimens spanning all major	Specimens Preserved parasites

4.3 Describe major invertebrate phyla: - Porifera - sponges. - Cnidaria - jellyfish, - hydra. - Platyhelminthes flatworms - Nematoda. - Annelida . - Mollusca - snails - Arthropoda - Echinodermata. 4.4 Describe veterinary-important invertebrates with focus on ticks, mites, helminths, flies. 4.5 Describe vertebrate classes: - Pisces (fish - Amphibia (frogs, toads). - Reptilia (lizards, snakes, crocodiles, tortoises) - Aves (birds) - Mammalia 4.6 Describe comparative morphology	- Describe major invertebrate phyla: — Porifera — sponges. — Cnidaria — jellyfish, — hydra. — Platyhelminthes flatworms — Nematoda. — Annelida . — Mollusca — snails — Arthropoda — Echinodermata. - Describe veterinary-important invertebrates with focus on ticks, mites, helminths, flies. - Describe vertebrate classes: — Pisces (fish — Amphibia (frogs, toads). — Reptilia (lizards, snakes, crocodiles, tortoises) — Aves (birds) — Mammalia - Describe comparative morphology - Describe ECOLOGICAL	board, Marker Text books, Internet. Lecture note, etc.	phyla. - Examine preserved tick, fluke, tapeworm, ascarid (veterinary parasites). - Collect common arthropods around the campus. - Observe live or preserved Tilapia, frog, lizard, chicken, rabbit (vertebrate classes). - Dissect a frog (or alternative) - Identify internal organs. - Construct a phylogenetic tree of major phyla.	phyla. - Examine preserved tick, fluke, tapeworm, ascarid (veterinary parasites). - Collect common arthropods around the campus. - Observe live or preserved Tilapia, frog, lizard, chicken, rabbit (vertebrate classes). - Dissect a frog (or alternative) - Identify internal organs. - Construct a phylogenetic tree of major phyla.	Collection equipment Live animals Dissection tools
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	4.7 Describe ECOLOGICAL roles of major phyla.	roles of major phyla.				
GENERAL OBJECTIVE 5.0: Understand basic animal physiology						
7-8	5.1 Describe nutrition. 5.2 Describe digestive types 5.3 Describe ruminant digestion 5.4 Describe non-ruminant herbivore digestion 5.5 Describe digestive enzymes 5.6 Describe circulatory systems 5.7 Explain mammalian heart 5.8 Describe blood components 5.9 Explain blood functions 5.10 Describe gas exchange in various groups 5.11 Describe respiration 5.12 Explain excretion 5.13 Describe kidney structure (nephron) and function 5.14 Explain water	• Describe nutrition. • Describe digestive types • Describe ruminant digestion • Describe non-ruminant herbivore digestion • Describe digestive enzymes • Explain circulatory systems • Describe mammalian heart • Explain blood components • Describe blood functions • Discuss gas exchange in various groups • Explain respiration • Describe excretion • Explain kidney structure (nephron) and function • Discuss water and electrolyte balance	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Examine a cow stomach (rumen, reticulum, omasum, abomasum) from abattoir • identify each compartment. • Test for starch (iodine), reducing sugar (Benedict's), protein (biuret) in food samples. • Examine prepared slides of blood, cardiac muscle, lung, kidney. • Identify chambers of mammalian heart from a fresh cow or sheep heart. • Measure pulse and respiration rate in a calm dog or rabbit. • Dissect a fish (Tilapia) • Identify gills and gut anatomy.	Guide students to: • Examine a cow stomach (rumen, reticulum, omasum, abomasum) from abattoir • identify each compartment. • Test for starch (iodine), reducing sugar (Benedict's), protein (biuret) in food samples. • Examine prepared slides of blood, cardiac muscle, lung, kidney. • Identify chambers of mammalian heart from a fresh cow or sheep heart. • Measure pulse and respiration rate in a calm dog or rabbit. • Dissect a fish (Tilapia) • Identify gills and gut anatomy.	Cow Sheep stomach Heart Reagents Including iodine Benedict's Biuret Microscope slides Live calm animals Fish specimens Dissection tools

	and electrolyte balance					
GENERAL OBJECTIVE 6.0: Understand microorganisms						
9	6.1 Explain microorganism and microbiology. 6.2 Explain bacteria 6.3 Describe veterinary-important bacteria 6.4 Explain viruses 6.5 Describe veterinary-important viruses 6.6 Describe fungi 6.7 Describe veterinary-important fungi 6.8 Explain protozoa 6.9 Describe veterinary-important protozoa 6.10 Explain role of microorganisms 6.11 Explain normal microbiota and pathogens. 6.12 Describe zoonotic microorganisms	- Describe microorganism and microbiology. - Describe bacteria - Explain veterinary-important bacteria - Describe viruses - Discuss veterinary-important viruses - Discuss fungi - Explain veterinary-important fungi - Discuss protozoa - Explain veterinary-important protozoa - Describe role of microorganisms - Discuss normal microbiota and pathogens. - Discuss zoonotic microorganisms	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	- Examine prepared slides of bacteria (gram-stained), fungi, protozoa. - Prepare a simple smear from a sample (e.g. yoghurt for Lactobacillus). - Observe a fungal culture; identify yeasts and moulds. - Prepare a wet mount of pond water; observe protozoa. - Identify 20 veterinary microorganisms from images.	Guide students to: - Examine prepared slides of bacteria (gram-stained), fungi, protozoa. - Prepare a simple smear from a sample (e.g. yoghurt for Lactobacillus). - Observe a fungal culture; identify yeasts and moulds. - Prepare a wet mount of pond water; observe protozoa. - Identify 20 veterinary microorganisms from images.	Prepared slides Microscope Yoghurt Agar plates Pond water Image bank
GENERAL OBJECTIVE 7.0: Understand ecology, ecosystems and conservation						
10-11	7.1 Define ecology, ecosystem, habitat, niche, population, community, biosphere.	- Explain ecology, ecosystem, habitat, niche, population, community, biosphere. - Describe abiotic factors.	Charts. Projector white board,	- Design a sampling quadrat for a campus area - Count plant species. - Construct a food	Guide students to: - Design a sampling quadrat for a campus area - Count plant species.	Quadrats Including rope Field equipment

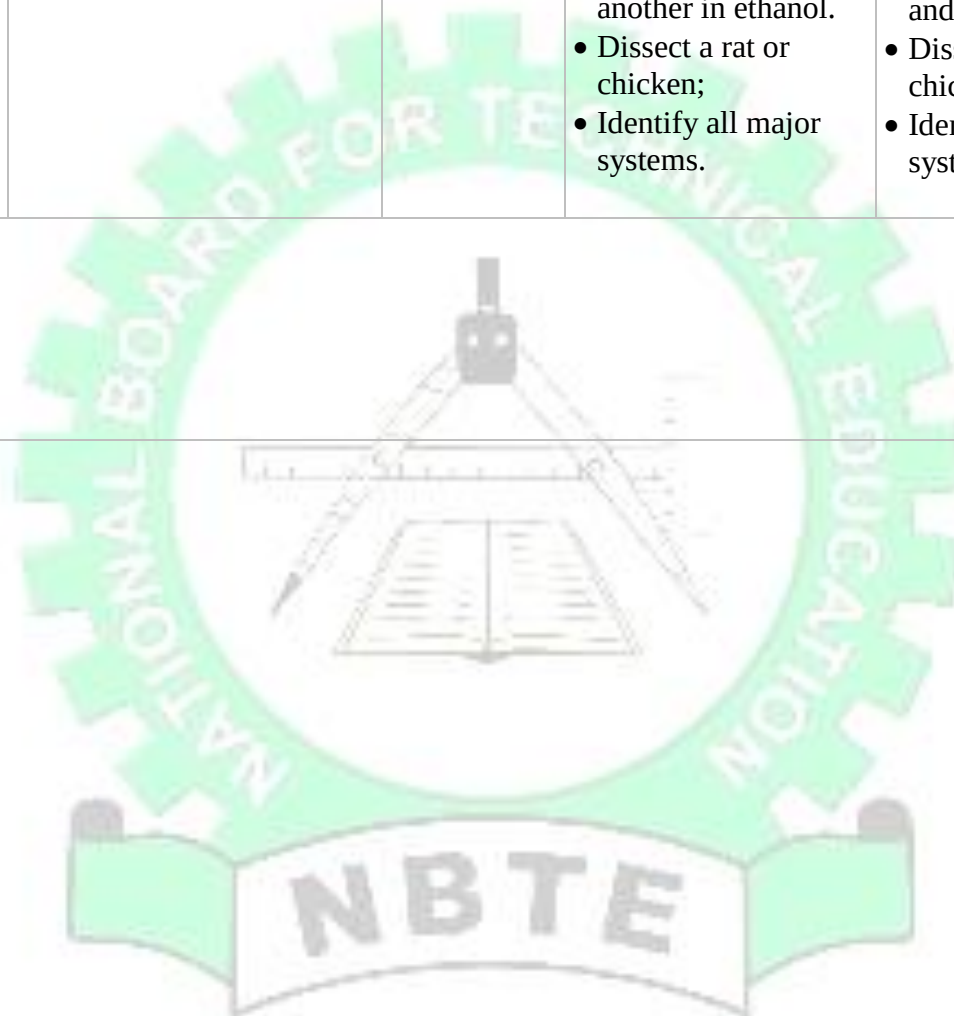
	7.2 Explain abiotic factors. 7.3 Describe biotic factors. 7.4 Explain food chains. 7.5 Explain biogeochemical cycles. 7.6 Explain Nigerian biomes. 7.7 Explain ecological relationships. 7.8 Explain population dynamics. 7.9 Describe environmental issues. 7.10 Explain conservation. 7.11 Explain One Health	• Explain biotic factors. • Describe food chains. • Explain biogeochemical cycles. • Discuss Nigerian biomes. • Discuss ecological relationships. • Describe population dynamics. • Describe environmental issues. • Explain conservation. • Discuss One Health	Marker Text books, Internet. Lecture note, etc.	web for a campus ecosystem. • Visit (in-person or virtual) a Nigerian protected area or zoo. • Describe the carbon cycle and its disturbance. • Identify 10 conservation challenges in Nigeria.	• Construct a food web for a campus ecosystem. • Visit (in-person or virtual) a Nigerian protected area or zoo. • Describe the carbon cycle and its disturbance. • Identify 10 conservation challenges in Nigeria.	Transport for visit Carbon cycle template
GENERAL OBJECTIVE 8.0: Understand reproduction, growth, development and genetics						
12-13	8.1 Explain reproduction types. 8.2 Describe sexual advantages. 8.3 Describe animal reproduction. 8.4 Explain mammalian reproduction. 8.5 Explain poultry	• Explain reproduction types. • Discuss sexual advantages. • Describe animal reproduction. • Discuss mammalian reproduction. • Discuss poultry	Charts. Projector white board, Marker Text books, Internet. Lecture	• Examine reproductive tract of cow, ewe or doe from abattoir. • Examine fertile chicken egg structure • Identify yolk, albumen, chalaza,	Guide students to: • Examine reproductive tract of cow, ewe or doe from abattoir. • Examine fertile chicken egg structure • Identify yolk, albumen, chalaza, shell. • Construct a Punnett	Fresh reproductive tracts Fertile chicken eggs Punnett square worksheets Banana

	reproduction. 8.6 Describe plant reproduction. 8.7 Explain growth/development 8.8 Explain Mendelian genetics. 8.9 Describe DNA structure. 8.10 Describe genetic code. 8.11 Explain mutation. 8.12 Describe applied genetics	reproduction. - Describe plant reproduction. - Discuss growth/development. - Explain Mendelian genetics. - Explain DNA structure. - Describe genetic code. - Explain mutation. - Describe applied genetics	note,etc.	shell. - Construct a Punnett square for 5 monohybrid crosses - Predict offspring ratio - Extract DNA from banana or onion using kitchen-chemistry method (salt, detergent, alcohol) - Examine prepared slides of mitosis and meiosis stages.	square for 5 monohybrid crosses - Predict offspring ratio - Extract DNA from banana or onion using kitchen-chemistry method (salt, detergent, alcohol) - Examine prepared slides of mitosis and meiosis stages.	Salt Detergent Alcohol Prepared slides
GENERAL OBJECTIVE 9.0: Apply basic biological laboratory techniques						
14-15	9.1 Describe microscope parts and functions. 9.2 Explain microscope use. 9.3 Describe magnification Explain sample preparation., 9.4 Describe staining, simple 9.5 Explain preservation., 9.6 Describe dissection 9.7 Explain laboratory safety in biological work. 9.8 Describe record	- Describe microscope parts. - Describe microscope use. - Discuss magnification. - Describe sample preparation. - Describe staining. - Describe preservation. - Describe dissection. - Describe biological safety. - Describe record keeping. - Describe computer applications.	Charts. Projector white board, Marker Text books, Internet. Lecture note,etc.	- Set up compound microscope - Use compound microscope - Clean a compound microscope. - Prepare a wet mount and observe - Prepare a fixed smear and stain with simple stain. - Perform Gram stain on a sample - Identify result. - Preserve a small	- Guide students to: Set up compound microscope - Use compound microscope - Clean a compound microscope. - Prepare a wet mount and observe - Prepare a fixed smear and stain with simple stain. - Perform Gram stain on a sample - Identify result.	Microscopes Stains and reagents Formalin Ethanol Rats Chickens for dissection Notebooks Examination rubric

	keeping, 9.9 Outline computer applications in biology			specimen in formalin and another in ethanol. • Dissect a rat or chicken; • Identify all major systems.	• Preserve a small specimen in formalin and another in ethanol. • Dissect a rat or chicken; • Identify all major systems.	
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COURSE ASSESSMENT:

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





INTRODUCTION TO ANIMAL DISEASES

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO ANIMAL DISEASES (RUMINANT AND MONOGASTRIC DIAGNOSTICS)	COURSE CODE: VLT 121	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOURS/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with the knowledge and skills to identify common diseases affecting ruminant and monogastric animals using appropriate clinical, laboratory, and diagnostic techniques.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Know the concept, classification and transmission of animal diseases. 2.0 Know common ruminant diseases of cattle and the laboratory tests that confirm them. 3.0 Know common diseases of sheep and goats and apply appropriate diagnostic support. 4.0 Know common diseases of pigs and indicate appropriate sample-based diagnosis. 5.0 Know common poultry diseases, post-mortem and laboratory support. 6.0 Understand common diseases of equines, rabbits and companion animals. 7.0 Understand notifiable, transboundary and emerging diseases of veterinary importance in Nigeria. 8.0 Understand the zoonotic disease risk in animal handling and laboratory work. 9.0 Know integrated clinical observation and sample selection for laboratory confirmation.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO ANIMAL DISEASES (RUMINANT AND MONOGASTRIC DIAGNOSTICS)			COURSE CODE: VLT 121		CONTACT HOURS: 5 HOURS/WEEK	
			CREDIT UNIT: 5		THEORETICAL: 2 HOURS/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and skills to identify common diseases affecting ruminant and monogastric animals using appropriate clinical, laboratory, and diagnostic techniques.						
GENERAL OBJECTIVE 1.0: Know the concept, classification and transmission of animal diseases.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1-2	1.1 Define disease, health, morbidity, mortality, prevalence and incidence. 1.2 Distinguish clinical from sub-clinical disease and acute from chronic disease. 1.3 Classify diseases by aetiology (infectious vs non-infectious; bacterial, viral, fungal, parasitic, nutritional, toxic, metabolic,	• Explain disease, health, morbidity, mortality, prevalence and incidence. • Distinguish clinical from sub-clinical disease and acute from chronic disease. • Classify diseases by aetiology (infectious vs non-infectious; bacterial, viral, fungal, parasitic, nutritional, toxic, metabolic,	Whiteboard, projector. Reference textbooks (Radostits — Veterinary Medicine; OIE Terrestrial Manual). Disease classification charts. Internet	• Categorise 30 sample diseases by aetiology, duration and extent. • Map the transmission mode of 20 common Nigerian livestock diseases. • Construct a disease triangle	Guide students to: • Categorise 30 sample diseases by aetiology, duration and extent. • Map the transmission mode of 20 common Nigerian livestock diseases. • Construct a disease triangle diagram for 5 specific diseases. • Visit institutional clinic	Disease list. Categorisation worksheets. Diagram templates. Clinic access. Notifiable disease guidelines.

genetic, traumatic, neoplastic). 1.4 Categorise diseases by extent (sporadic, endemic, epidemic/epizootic, pandemic/panzootic). 1.5 Explain the disease triangle: agent, host and environment. 1.6 Outline the phases of disease progression: incubation, prodromal, clinical, convalescence. 1.7 List modes of disease transmission (direct, indirect, vector-borne, vertical, iatrogenic, airborne, fomite, food/water). 1.8 Explain herd immunity, basic reproductive number (R_0) and threshold density. 1.9 State the role of the veterinary laboratory in disease diagnosis, surveillance and outbreak investigation. 1.10 Explain the Nigerian notifiable disease list and reporting	genetic, traumatic, neoplastic). • Categorise diseases by extent (sporadic, endemic, epidemic/epizootic, pandemic/panzootic). • Explain the disease triangle: agent, host and environment. • Outline the phases of disease progression: incubation, prodromal, clinical, convalescence. • List modes of disease transmission (direct, indirect, vector-borne, vertical, iatrogenic, airborne, fomite, food/water). • Explain herd immunity, basic reproductive number (R_0) and threshold density. • State the role of the veterinary laboratory in disease diagnosis, surveillance and outbreak investigation. • Explain the Nigerian notifiable disease list	Marker Sample notifiable disease list.	diagram for 5 specific diseases. • Visit institutional clinic • Observe how a case is presented and documented. • Compile a list of the 15 currently notifiable diseases in Nigeria and their reporting channels.	• Observe how a case is presented and documented. • Compile a list of the 15 currently notifiable diseases in Nigeria and their reporting channels.	
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	framework.	and reporting framework.				
GENERAL OBJECTIVE 2.0: Know common ruminant diseases of cattle and the laboratory tests that confirm them.						
3-4	2.1 List common bacterial diseases of cattle: brucellosis (<i>Brucella abortus</i>), bovine tuberculosis (<i>Mycobacterium bovis</i>), anthrax (<i>Bacillus anthracis</i>), blackleg (<i>Clostridium chauvoei</i>), haemorrhagic septicaemia (<i>Pasteurella multocida</i>), CBPP (Contagious Bovine Pleuropneumonia) 2.2 State the confirmatory tests for each: Rose Bengal Plate Test, c-ELISA, milk ring test (brucellosis); tuberculin skin test, Ziehl-Neelsen stain, IFN-γ assay (TB); peripheral blood smear (anthrax). 2.3 Define major viral diseases of cattle: foot-and-mouth disease (FMD), lumpy skin	- List common bacterial diseases of cattle: brucellosis (<i>Brucella abortus</i>), bovine tuberculosis (<i>Mycobacterium bovis</i>), anthrax (<i>Bacillus anthracis</i>), blackleg (<i>Clostridium chauvoei</i>), haemorrhagic septicaemia (<i>Pasteurella multocida</i>), CBPP (Contagious Bovine Pleuropneumonia) - State the confirmatory tests for each: Rose Bengal Plate Test, c-ELISA, milk ring test (brucellosis); tuberculin skin test, Ziehl-Neelsen stain, IFN-γ assay (TB); peripheral blood smear (anthrax). - Define major viral diseases of cattle: foot-and-mouth disease (FMD), lumpy skin	Disease Atlases. OIE Terrestrial Manual. Sample diagnostic reports. Reference textbooks. Projector. Internet White board Marker	- Examine preserved organ specimens from abattoir (lung, liver, lymph node, spleen) for gross pathology. - Prepare and stain a thin blood smear for trypanosome examination. - Conduct McMaster faecal egg count on a cow faecal sample; calculate eggs per gram (epg). - Demonstrate the Rose Bengal Plate Test on sample sera. - Match 15 cattle diseases to their diagnostic laboratory tests in a workshop	Guide students to: - Examine preserved organ specimens from abattoir (lung, liver, lymph node, spleen) for gross pathology. - Prepare and stain a thin blood smear for trypanosome examination. - Conduct McMaster faecal egg count on a cow faecal sample; calculate eggs per gram (epg). - Demonstrate the Rose Bengal Plate Test on sample sera. - Match 15 cattle diseases to their diagnostic laboratory tests in a workshop exercise. - Investigate Nigerian cattle disease burden statistics from NVRI or FMLD reports.	Preserved organs. Microscope, slides, coverslips, syringes. Faecal samples. McMaster slide. RBPT kit. Cattle, collection kit. Sample containers

disease (LSD), bovine viral diarrhoea (BVD). 2.4 Match each viral disease to its appropriate diagnostic test (ELISA, RT-PCR, virus neutralisation). 2.5 Explain parasitic diseases: trypanosomiasis (<i>Trypanosoma vivax</i>, <i>T. congolense</i>), babesiosis (<i>Babesia bigemina</i>), anaplasmosis, fasciolosis (<i>Fasciola gigantica</i>), gastrointestinal helminthiasis, ticks. 2.6 Explain parasite-identification techniques: thick/thin blood smears, faecal sedimentation, faecal flotation, McMaster faecal egg count. 2.7 Distinguish metabolic and production diseases: milk fever, ketosis, ruminal acidosis, mastitis. 2.8 Determine the appropriate sample type	disease (LSD), bovine viral diarrhoea (BVD). • Match each viral disease to its appropriate diagnostic test (ELISA, RT-PCR, virus neutralisation). • Explain parasitic diseases: trypanosomiasis (<i>Trypanosoma vivax</i>, <i>T. congolense</i>), babesiosis (<i>Babesia bigemina</i>), anaplasmosis, fasciolosis (<i>Fasciola gigantica</i>), gastrointestinal helminthiasis, ticks. • Explain parasite-identification techniques: thick/thin blood smears, faecal sedimentation, faecal flotation, McMaster faecal egg count. • Distinguish metabolic and production diseases: milk fever, ketosis, ruminal acidosis, mastitis. • Determine the		exercise. • Investigate Nigerian cattle disease burden statistics from NVRI or FMLD reports. • Collect blood (jugular or coccygeal) under supervision; assign to appropriate tubes for various tests.	• Collect blood (jugular or coccygeal) under supervision; assign to appropriate tubes for various tests.	
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	for each cattle disease (whole blood, serum, milk, faeces, tissue, swab). 2.9 Explain the role of the laboratory in supporting Nigerian dairy and beef cattle production.	appropriate sample type for each cattle disease (whole blood, serum, milk, faeces, tissue, swab). • Explain the role of the laboratory in supporting Nigerian dairy and beef cattle production.				
GENERAL OBJECTIVE 3.0: Know common diseases of sheep and goats and apply appropriate diagnostic support.						
5-6	3.1 Explain Peste des Petits Ruminants (PPR) — the most devastating small-ruminant disease in Nigeria -including clinical signs 3.2 Explain Contagious Caprine Pleuropneumonia (CCPP) caused by <i>Mycoplasma capricolum</i> capripneumoniae and its confirmatory testing. 3.3 Describe sheep and goat pox (Capripoxvirus) and contagious ecthyma (Orf — a zoonosis). 3.4 Explain the impact of helminthiasis for diagnosis.	• Explain Peste des Petits Ruminants (PPR) — the most devastating small-ruminant disease in Nigeria -including clinical signs • Explain Contagious Caprine Pleuropneumonia (CCPP) caused by <i>Mycoplasma capricolum</i> capripneumoniae and its confirmatory testing. • Describe sheep and goat pox (Capripoxvirus) and contagious ecthyma (Orf — a zoonosis). • Explain the impact of helminthiasis for	Disease atlases. PPR/CCPP guidelines. FAMACHA cards. OIE Terrestrial Manual. NVRI publications. Reference textbooks. Projector. Internet White board	• Identify PPR clinical signs from photographs and video clips. • Perform FAMACHA scoring on 10 sheep/goats • Correlate with anaemia and recommend treatment. • Execute McMaster FEC on small-ruminant faecal samples • Calculate epg and interpret. • Prepare a faecal flotation smear;	Guide students to: • Identify PPR clinical signs from photographs and video clips. • Perform FAMACHA scoring on 10 sheep/goats • Correlate with anaemia and recommend treatment. • Execute McMaster FEC on small-ruminant faecal samples • Calculate epg and interpret. • Prepare a faecal flotation smear; • Examine for coccidial	Disease photos/videos. FAMACHA cards. Faecal samples. Blood Samples McMaster slide. Swab kits, VTM. Microscope, slides, Coverslips Sheep/goats. Welfare checklist.

3.5 List common ectoparasitic conditions (sheep/goat mange, lice, ticks) 3.6 Explain the microscopic differentiation of mites. 3.7 Distinguish abortion causes in small ruminants: <i>Brucella melitensis</i>, <i>Toxoplasma gondii</i>, <i>Chlamydophila abortus</i>, <i>Listeria monocytogenes</i>, Q-fever (<i>Coxiella burnetii</i>). 3.8 List other important conditions: foot-rot, enterotoxaemia (<i>Clostridium perfringens</i>), heartwater (<i>Ehrlichia ruminantium</i>), mastitis, caseous lymphadenitis. 3.9 Outline nutritional and metabolic disorders: pregnancy toxemia, mineral deficiency (Cu, Se, Co), urolithiasis. 3.10 Describe the role of NVRI Vom in PPR vaccine production and Nigerian small-ruminant disease control.	diagnosis. • List common ectoparasitic conditions (sheep/goat mange, lice, ticks) • Explain the microscopic differentiation of mites. • Distinguish abortion causes in small ruminants: <i>Brucella melitensis</i>, <i>Toxoplasma gondii</i>, <i>Chlamydophila abortus</i>, <i>Listeria monocytogenes</i>, Q-fever (<i>Coxiella burnetii</i>). • List other important conditions: foot-rot, enterotoxaemia (<i>Clostridium perfringens</i>), heartwater (<i>Ehrlichia ruminantium</i>), mastitis, caseous lymphadenitis. • Outline nutritional and metabolic disorders: pregnancy toxemia, mineral deficiency (Cu, Se, Co), urolithiasis. • Describe the role of NVRI Vom in PPR	• Examine for coccidial oocysts • Identify the species. • Collect oculo-nasal swab from a sheep or goat using a sterile swab in viral transport medium. • Investigate ectoparasites collected from small ruminants under the microscope; • Differentiate mite species. • Design a flock-health surveillance programme for a 100-head goat herd, including PPR. • Compose a sample-submission checklist for suspected PPR or CCPP cases. • Conduct a brief	oocysts • Identify the species. • Collect oculo-nasal swab from a sheep or goat using a sterile swab in viral transport medium. • Investigate ectoparasites collected from small ruminants under the microscope; • Differentiate mite species. • Design a flock-health surveillance programme for a 100-head goat herd, including PPR. • Compose a sample-submission checklist for suspected PPR or CCPP cases. • Conduct a brief flock-level welfare assessment alongside disease screening.	
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	3.11 Explain the correct sample collection method for each major small-ruminant disease.	vaccine production and Nigerian small-ruminant disease control. • Explain the correct sample collection method for each major small-ruminant disease.		flock-level welfare assessment alongside disease screening.		
GENERAL OBJECTIVE 4.0: Know common diseases of pigs and indicate appropriate sample-based diagnosis.						
7-8	4.1 Outline African Swine Fever (ASF) 4.2 Distinguish Classical Swine Fever (CSF) from ASF by clinical presentation and laboratory differentiation (ELISA, PCR). 4.3 Explain Porcine Reproductive and Respiratory Syndrome (PRRS) 4.4 Explain diagnostic ELISA and PCR tests. 4.5 Define zoonotic swine diseases: swine influenza (PCR), swine erysipelas (Erysipelothrix rhusiopathiae —	• Explain African Swine Fever (ASF) • Distinguish Classical Swine Fever (CSF) from ASF by clinical presentation and laboratory differentiation (ELISA, PCR). • Explain Porcine Reproductive and Respiratory Syndrome (PRRS) • Explain diagnostic ELISA and PCR tests. • Define zoonotic swine diseases: swine influenza (PCR), swine erysipelas (Erysipelothrix rhusiopathiae culture),	Disease atlases. ASF emergency guidelines. OIE Terrestrial Manual. Reference textbooks. Projector. White board Marker Internet	• Identify ASF clinical signs and gross post-mortem lesions from image atlases. • Review swine erysipelas skin lesions from photographs. • Collect ear-vein blood sample from a pig (under supervision or simulation). • Conduct faecal flotation for Ascaris suum eggs. • Devise an emergency response checklist	Guide students to: • Identify ASF clinical signs and gross post-mortem lesions from image atlases. • Review swine erysipelas skin lesions from photographs. • Collect ear-vein blood sample from a pig (under supervision or simulation). • Conduct faecal flotation for Ascaris suum eggs. • Devise an emergency response checklist for a suspected ASF outbreak on a Nigerian farm. • Match 12 major swine	Image atlas. Pigs (if available). Sample collection kit. Faecal samples. Checklist template. Matching worksheet. Research materials.

	culture), swine brucellosis (<i>Brucella suis</i>). 4.6 Explain <i>Mycoplasma pneumoniae</i>, porcine circovirus disease (PCV2 PMWS), colibacillosis in piglets. 4.7 Describe swine parasites: <i>Ascaris suum</i>, <i>Trichinella spiralis</i> (a zoonosis), <i>Sarcoptes scabiei</i>. 4.8 Describe special biosafety precautions for ASF sample handling. 4.9 Determine appropriate sample types: serum, whole blood (EDTA), tonsil swab, organ pieces (spleen, lymph node, kidney). 4.10 Trace the impact of recent ASF outbreaks on the Nigerian pig industry (2018–2025).	swine brucellosis (<i>Brucella suis</i>). • Explain <i>Mycoplasma pneumoniae</i>, porcine circovirus disease (PCV2 PMWS), colibacillosis in piglets. • Describe swine parasites: <i>Ascaris suum</i>, <i>Trichinella spiralis</i> (a zoonosis), <i>Sarcoptes scabiei</i>. • Describe special biosafety precautions for ASF sample handling. • Determine appropriate sample types: serum, whole blood (EDTA), tonsil swab, organ pieces (spleen, lymph node, kidney). • Trace the impact of recent ASF outbreaks on the Nigerian pig industry (2018–2025).		for a suspected ASF outbreak on a Nigerian farm. • Match 12 major swine diseases to their laboratory confirmation tests. • Investigate Nigerian ASF burden and economic impact through literature search.	diseases to their laboratory confirmation tests. • Investigate Nigerian ASF burden and economic impact through literature search.	
GENERAL OBJECTIVE 5.0: Know common poultry diseases and demonstrate post-mortem and laboratory support.						
9-10	5.1 Describe Newcastle Disease. 5.2 Explain Highly	• Describe Newcastle Disease clinical forms (respiratory, nervous,	Disease atlases. HPAI	• Perform systematic post-mortem on a	Guide students to: • Perform systematic post-mortem on a	Poultry carcasses. Preserved

Pathogenic Avian Influenza (HPAI H5N1) 5.3 Explain Infectious Bursal Disease (Gumboro disease) immunosuppression, ELISA serology, histopathology of bursa. 5.4 Describe Infectious Bronchitis, Marek's Disease and avian encephalomyelitis. 5.5 Describe coccidiosis diagnosis through faecal flotation and post-mortem identification of caecal vs intestinal Eimeria species. 5.6 Distinguish mycoplasmosis (M. gallisepticum, M. synoviae) by serology and PCR. 5.7 Examine salmonellosis (Pullorum-typhoid, Enteritidis — zoonotic) and colibacillosis through culture and serology. 5.8 Describe avian aspergillosis (lung lesions) and avian	GI), notifiable status, HA/HI test and RT-PCR diagnosis. • Explain Highly Pathogenic Avian Influenza (HPAI H5N1) zoonotic, notifiable, urgent PCR confirmation, emergency response protocol. • Explain Infectious Bursal Disease (Gumboro disease) immunosuppression, ELISA serology, histopathology of bursa. • Describe Infectious Bronchitis, Marek's Disease and avian encephalomyelitis. • Describe coccidiosis diagnosis through faecal flotation and post-mortem identification of caecal vs intestinal Eimeria species. • Distinguish mycoplasmosis (M. gallisepticum, M. synoviae) by serology	guidelines. OIE Terrestrial Manual. Reference textbooks. Projector. White board Internet Marker	poultry carcass • Examine every organ system. • Identify Newcastle and coccidiosis gross lesions in preserved specimens. • Collect cloacal and tracheal swabs into appropriate transport medium. • Conduct faecal flotation for coccidial oocyst identification. • Demonstrate the haemagglutination-inhibition (HI) test on chicken serum (or simulation). • Identify lice, mites and helminths recovered from poultry samples. • Devise a Newcastle disease surveillance programme for a	poultry carcass • Examine every organ system. • Identify Newcastle and coccidiosis gross lesions in preserved specimens. • Collect cloacal and tracheal swabs into appropriate transport medium. • Conduct faecal flotation for coccidial oocyst identification. • Demonstrate the haemagglutination-inhibition (HI) test on chicken serum (or simulation). • Identify lice, mites and helminths recovered from poultry samples. • Devise a Newcastle disease surveillance programme for a commercial layer farm. • Compose an HPAI emergency response checklist for the	specimens. Swab kits. Flotation reagent. HI test kit. Parasite samples. Programme template. Checklist template.
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	parasitism (lice, mites, Ascaridia, Heterakis). 5.9 Perform a systematic post-mortem examination on a poultry carcass. 5.10 Describe the correct sampling approach for HPAI emergency response (cloacal swab, tracheal swab, oropharyngeal swab, organ pieces). 5.11 Trace the surveillance pathway for Nigerian poultry diseases through state veterinary services.	and PCR. • Examine salmonellosis (Pullorum-typhoid, Enteritidis zoonotic) and colibacillosis through culture and serology. • Describe avian aspergillosis (lung lesions) and avian parasitism (lice, mites, Ascaridia, Heterakis). • Perform a systematic post-mortem examination on a poultry carcass. • Describe the correct sampling approach for HPAI emergency response (cloacal swab, tracheal swab, oropharyngeal swab, organ pieces). • Trace the surveillance pathway for Nigerian poultry diseases through state veterinary services.		commercial layer farm. • Compose an HPAI emergency response checklist for the institutional poultry unit.	institutional poultry unit.	
GENERAL OBJECTIVE 6.0: Understand common diseases of equines, rabbits and companion animals.						
11	6.1 List equine diseases such	• List equine diseases	Companion	• Visit the	Guide students to:	Clinic access.

as: - African horse sickness (notifiable), - Strangles (<i>Streptococcus equi</i>), - Equine infectious anaemia (Coggins test), - Trypanosomiasis (Surra/Dourine), tetanus. 6.2 List canine diseases such as: - Rabies notifiable - Zoonotic - Direct fluorescent antibody test), canine - Distemper (PCR), - Canine parvovirus (faecal antigen test), \ - leptospirosis (zoonotic, MAT, PCR), - Ehrlichiosis, - Babesiosis, - Demodicosis, scabies. 6.3 Distinguish feline diseases such as: Feline panleukopenia, Feline respiratory complex, Feline leukaemia virus, Toxoplasmosis (zoonotic). 6.4 Examine rabbit diseases:	such as: — African horse sickness (notifiable), — Strangles (<i>Streptococcus equi</i>), — Equine infectious anaemia (Coggins test), — Trypanosomiasis (Surra/Dourine), tetanus. • List canine diseases such as: — Rabies notifiable — Zoonotic — Direct fluorescent antibody test), canine — Distemper (PCR), — Canine parvovirus (faecal antigen test), \ — leptospirosis (zoonotic, MAT, PCR), — Ehrlichiosis, — Babesiosis, — Demodicosis, scabies. • Distinguish feline diseases such as:	animal disease atlases. Reference textbooks. Projector. Internet Whiteboard Marker	institutional small-animal clinic • Observe common cases. • Prepare a thin blood smear from a dog blood sample (with owner consent). • Conduct faecal flotation on a dog sample for endoparasites. • Identify common dog/cat ectoparasites under microscope. • Match 15 companion animal diseases to their diagnostic laboratory tests. • Examine an equine sample (if available) for trypanosomiasis using buffy coat technique.	• Visit the institutional small-animal clinic • Observe common cases. • Prepare a thin blood smear from a dog blood sample (with owner consent). • Conduct faecal flotation on a dog sample for endoparasites. • Identify common dog/cat ectoparasites under microscope. • Match 15 companion animal diseases to their diagnostic laboratory tests. • Examine an equine sample (if available) for trypanosomiasis using buffy coat technique.	Dog blood sample. Faecal samples. Ectoparasite samples. Matching worksheet. Microscope, slides.
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	pasteurellosis (snuffles), rabbit coccidiosis, rabbit haemorrhagic disease, ear mites, sore hocks. 6.5 Review laboratory animal diseases (from VLT 113). 6.6 Determine appropriate samples and laboratory tests for each species. 6.7 Discuss the One Health relevance of companion animal diseases.	— Feline panleukopenia, — Feline respiratory complex, \ — Feline leukaemia virus, — Toxoplasmosis (zoonotic). • Explain rabbit diseases: pasteurellosis (snuffles), rabbit coccidiosis, rabbit haemorrhagic disease, ear mites, sore hocks. • Review laboratory animal diseases (from VLT 113). • Determine appropriate samples and laboratory tests for each species. • Discuss the One Health relevance of companion animal diseases.				
GENERAL OBJECTIVE 7.0: Discuss notifiable, transboundary and emerging diseases of veterinary importance in Nigeria.						
12	7.1 List WOAHOIE notifiable diseases relevant to Nigeria. 7.2 List transboundary animal diseases (TADs): i. FMD,	• List WOAHOIE notifiable diseases relevant to Nigeria. • List transboundary animal diseases (TADs) — FMD,	WOAH disease list. FMARD notifiable list. TAD guidelines.	• Compile the priority Nigerian notifiable diseases (top 15) • Investigate one Nigerian TAD	Guide students to: • Compile the priority Nigerian notifiable diseases (top 15) with reporting routes. • Investigate one	Notifiable disease list. Outbreak reports. Flowchart template.

ii. HPAI, iii. ASF, iv. PPR, v. Rift Valley vi. Fever, vii. lumpy skin disease, viii. capripox. 7.3 List emerging and re-emerging diseases: i. Avian influenza variants, ii. Coronavirus zoonoses, iii. Rift Valley fever resurgence, iv. Climate-driven vector-borne diseases. 7.4 Outline the role of Nigerian institutions: FMLD, State veterinary services, NVRI, NCDC, NiNAS. 7.5 Outline international agencies: i. WOA, H, ii. FAO, iii. WHO, iv. ECTAD, v. The Quadripartite One Health alliance. 7.6 Describe the disease	— HPAI, — ASF, — PPR, — Rift Valley — Fever, — lumpy skin disease, — capripox. • List emerging and re-emerging diseases: — Avian influenza variants, — Coronavirus zoonoses, — Rift Valley fever resurgence, — Climate-driven vector-borne diseases. • Outline the role of Nigerian institutions: — FMLD, — State veterinary services, — NVRI, — NCDC, — NiNAS. • Outline international agencies: . WOA, H, . FAO, . WHO, . ECTAD,	Reference materials. Projector. Internet White board Marker	outbreak from the last 5 years through literature review. • Construct a reporting flowchart for suspected HPAI in a poultry farm. • Examine an emerging disease report from a West African country.	Nigerian TAD outbreak from the last 5 years through literature review. • Construct a reporting flowchart for suspected HPAI in a poultry farm. • Examine an emerging disease report from a West African country.	Research access.
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	reporting pathway: farm → veterinarian → state veterinary services → FMLD → WOAAH. 7.7 Explain disease-free status certification for international livestock trade. 7.8 State the role of the laboratory technologist in early detection and outbreak notification.	The Quadripartite One Health alliance. - Describe the disease reporting pathway: farm → veterinarian → state veterinary services → FMLD → WOAAH. - Explain disease-free status certification for international livestock trade. - State the role of the laboratory technologist in early detection and outbreak notification.				
GENERAL OBJECTIVE 8.0: Understand the zoonotic disease risk in animal handling and laboratory work.						
13	8.1 Define zoonosis 8.2 Explain the One Health concept. 8.3 List major Nigerian zoonoses: - Rabies, brucellosis, - Bovine TB, - Anthrax, leptospirosis, - Lassa fever, - Salmonellosis, - Listeriosis, avian/swine influenza, - Toxoplasmosis, - Cryptosporidiosis,	Define zoonosis Explain the One Health concept. List major Nigerian zoonoses: - Rabies, brucellosis, - Bovine TB, - Anthrax, leptospirosis, - Lassa fever, - Salmonellosis, - Listeriosis, avian/swine influenza,	Zoonosis atlases. NCDC reports. Reference textbooks. Projector. Internet	- Compile the top 10 zoonoses by Nigerian public health impact. - Devise a prevention checklist for a laboratory technologist handling zoonotic samples. - Trace a Lassa fever outbreak from animal	Guide students to: - Compile the top 10 zoonoses by Nigerian public health impact. - Devise a prevention checklist for a laboratory technologist handling zoonotic samples. - Trace a Lassa fever outbreak from animal source to human cases through a case study. - Examine AMR	Zoonosis list. Checklist template. Case study materials. AMR data.

	ix. Echinococcosis, ringworm, orf, x. Q-fever. 8.4 Explain zoonoses by route of transmission (direct contact, fomite, vector-borne, food-borne, water-borne, aerosol). 8.5 Describe route-specific preventive measures (PPE, hygiene, vaccination, surveillance). 8.6 Explain occupational zoonotic risk for abattoir workers, herders and laboratory technologists. 8.7 Discuss antimicrobial resistance (AMR) as a One Health concern. 8.8 Outline Nigerian One Health Strategic Plan and NCDC role. 8.9 State biosafety levels required for handling zoonotic samples (BSL-2 routine, BSL-3 for high-risk).	— Toxoplasmosis, — Cryptosporidiosis, — Echinococcosis, ringworm, orf, — Q-fever. • Explain zoonoses by route of transmission (direct contact, fomite, vector-borne, food-borne, water-borne, aerosol). • Describe route-specific preventive measures (PPE, hygiene, vaccination, surveillance). • Explain occupational zoonotic risk for abattoir workers, herders and laboratory technologists. • Discuss antimicrobial resistance (AMR) as a One Health concern. • Outline Nigerian One Health Strategic Plan and NCDC role. • State biosafety levels required for handling zoonotic samples (BSL-2 routine, BSL-3 for		source to human cases through a case study. • Examine AMR surveillance data from Nigerian livestock.	surveillance data from Nigerian livestock.	
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		high-risk).				
GENERAL OBJECTIVE 9.0: Know integrated clinical observation and sample selection for laboratory confirmation.						
14-15	9.1 Outline major clinical signs i. Respiratory ii. Digestive iii. Reproductive, Dermatological, Neurological, iv. Lameness. 9.2 Explain a differential diagnosis list from clinical signs. 9.3 Explain appropriate laboratory tests to confirm each differential. 9.4 Explain appropriate sample type for each clinical scenario. 9.5 Explain basic laboratory results in clinical context. 9.6 Discuss findings to the veterinarian and farmer.	• Outline major clinical signs — Respiratory — Digestive — Reproductive, Dermatological, Neurological, — Lameness. • Explain a differential diagnosis list from clinical signs. • Explain appropriate laboratory tests to confirm each differential. • Explain appropriate sample type for each clinical scenario. • Explain basic laboratory results in clinical context. • Discuss findings to the veterinarian and farmer.	Clinical case studies. Differential diagnosis charts. Sample submission forms. Reference textbooks. Projector. Internet White board Marker	• Measure TPR on cattle, sheep, dog and chicken. • Work through 5 case studies, history, signs, differential, sample, test selection. • Complete a sample submission form for a hypothetical clinical case. • Devise a quick-reference card linking common clinical signs to differentials and required samples. • Demonstrate competence in the final practical examination on a clinical case. • Complete the final integrated written assessment.	Guide students to: • Measure TPR on cattle, sheep, dog and chicken. • Work through 5 case studies, history, signs, differential, sample, test selection. • Complete a sample submission form for a hypothetical clinical case. • Devise a quick-reference card linking common clinical signs to differentials and required samples. • Demonstrate competence in the final practical examination on a clinical case. • Complete the final integrated written assessment.	Thermometer, stethoscope. Case study materials. Submission forms. Reference card template. Examination rubric.

COURSE ASSESSMENT:

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



INTRODUCTION TO VETERINARY DRUGS

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO VETERINARY DRUGS	COURSE CODE: VLT 122	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course designed to equip students with the knowledge and skills of veterinary medicinal products and biologicals (vaccines, antisera, diagnostic reagents) and the laboratory testing of animal products and by-products.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand veterinary medicinal products and biologicals. 2.0 Know differentiate routes of administration and basic dosing calculations. 3.0 Know antimicrobial classes and analyse antimicrobial resistance (AMR). 4.0 Understand antiparasitics, anti-inflammatories, anaesthetics, hormones, vaccines and biologicals. 5.0 Know correct drug and biological storage with cold-chain monitoring. 6.0 Understand drug-residue testing and verify withdrawal-period compliance. 7.0 Know animal products, by-products and their commercial importance. 8.0 Know basic physical and chemical quality testing on hides, skins, bone meal and other by-products. 9.0 Understand the regulatory framework and outline the technologist's role in compliance.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY DRUGS			COURSE CODE: VLT 122		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course designed to equip students with the knowledge and skills of veterinary medicinal products and biologicals (vaccines, antisera, diagnostic reagents) and the laboratory testing of animal products and by-products.						
GENERAL OBJECTIVE 1.0: Understand veterinary medicinal products and biologicals by source, action and dosage form.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define veterinary medicinal product and biological 1.2 Discuss sources of veterinary drugs: i. Plant, ii. Animal, iii. Microbial, iv. Mineral, v. Synthetic, vi. Biotechnology. 1.3 Discuss drugs by therapeutic action	- List veterinary medicinal products and biological. - Mention sources of veterinary drugs: plant, animal, microbial, mineral, synthetic, biotechnology. - Define drugs by therapeutic action (antimicrobial, antiparasitic, anti-	Picture of Sample drug packages. Drug formulary (Plumb’s). NAFDAC MAS demo. Reference textbooks. Projector. Internet White board marker	- Examine 10 different dosage forms - Tabulate their components and intended use. - Read drug labels for 10 products - Extract every required label field. - Locate the NAFDAC	Guide students to: - Examine 10 different dosage forms - Tabulate their components and intended use. - Read drug labels for 10 products - Extract every required label field. - Locate the NAFDAC	Drug samples. Drug formulary. NAFDAC info. Mobile phone for MAS. Research access. PPE

	(antimicrobial, antiparasitic, anti-inflammatory, anaesthetic, hormone, vitamin/mineral, vaccine). 1.4 Discuss drugs by chemical class (penicillins, tetracyclines, aminoglycosides, sulfonamides, fluoroquinolones). 1.5 Discuss dosage forms: tablets, capsules, powders, pastes, injectables (solution, suspension), pour-on, ear tag, intramammary, intra-uterine, eye/ear drops, ointments. 1.6 Discuss biologicals: live attenuated and inactivated vaccines, antisera, diagnostic antigens. 1.7 Discuss drug labels for active ingredient, concentration, batch number, dates, withdrawal period,	inflammatory, anaesthetic, hormone, vitamin/mineral, vaccine). • Define drugs by chemical class (penicillins, tetracyclines, aminoglycosides, sulfonamides, fluoroquinolones). • List dosage forms: tablets, capsules, powders, pastes, injectables (solution, suspension), pour-on, ear tag, intramammary, intra-uterine, eye/ear drops, ointments. • Define biologicals: live attenuated and inactivated vaccines, antisera, diagnostic antigens. • Explain drug labels for active		registration number on 5 drug packages. • Demonstrate verification of a drug pack using NAFDAC MAS SMS code. • Profile one Nigerian veterinary drug manufacturer.	registration number on 5 drug packages. • Demonstrate verification of a drug pack using NAFDAC MAS SMS code. • Profile one Nigerian veterinary drug manufacturer.	
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	storage conditions. 1.8 Discuss the role of NVRI Vom and NAFDAC-registered manufacturers in Nigerian veterinary biologicals. 1.9 Discuss the public-health risk of counterfeit and substandard veterinary drugs in Nigeria; verify authenticity with NAFDAC Mobile Authentication Service (MAS).	ingredient, concentration, batch number, dates, withdrawal period, storage conditions. • Mention the role of NVRI Vom and NAFDAC-registered manufacturers in Nigerian veterinary biologicals. • Explain the public-health risk of counterfeit and substandard veterinary drugs in Nigeria; verify authenticity with NAFDAC Mobile Authentication Service (MAS).				
GENERAL OBJECTIVE 2.0: Know routes of administration and demonstrate basic dosing calculations.						
2	2.1 Describe oral (PO), parenteral (IM, SC, IV, IP, intradermal), topical, transdermal, intramammary, intra-	• Explain oral (PO), parenteral (IM, SC, IV, IP, intradermal), topical,	Route diagrams. Drug formulary. Calculator. Reference textbooks.	• Identify the route of administration of 15 sample drug products. • Practice IM	Guide students to: • Identify the route of administration of 15 sample drug products.	Drug samples. Injection model. Calculator, problem set. Drug samples

uterine, inhalational and rectal routes. 2.2 Discuss dose, dosage, frequency (BID, TID, q12h) and duration. 2.3 Explain how to calculate dose: $\text{dose (mg)} = \text{body weight (kg)} \times \text{dosage (mg/kg)}$; $\text{volume (mL)} = \text{dose (mg)} \div \text{concentration (mg/mL)}$. 2.4 Discuss drug-drug interactions (incompatibility, synergism, antagonism). 2.5 Discuss adverse drug reactions and reporting channels (NAFDAC pharmacovigilance). 2.6 Discuss the supportive role of the lab technologist in safe drug use.	transdermal, intramammary, intra-uterine, inhalational and rectal routes. • Define dose, dosage, frequency (BID, TID, q12h) and duration. • Explain how to calculate dose: $\text{dose (mg)} = \text{body weight (kg)} \times \text{dosage (mg/kg)}$; $\text{volume (mL)} = \text{dose (mg)} \div \text{concentration (mg/mL)}$. • Explain drug-drug interactions (incompatibility, synergism, antagonism). • Outline adverse drug reactions and reporting channels (NAFDAC pharmacovigilance). • State the supportive role of	Projector. Internet White board Marker	injection on an injection model. • Calculate doses for 20 hypothetical clinical scenarios. • Prepare a 1:10 dilution of an injectable drug. • Constitute medicated-water dose for a poultry flock.	• Practice IM injection on an injection model. • Calculate doses for 20 hypothetical clinical scenarios. • Prepare a 1:10 dilution of an injectable drug. • Compute medicated-water dose for a poultry flock.	for dilution. Water medication template. Needles/syringes PPE
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		the lab technologist in safe drug use.				
GENERAL OBJECTIVE 3.0: Know antimicrobial classes and analyze antimicrobial resistance (AMR).						
3-4	3.1 Define antimicrobial, antibiotic and antibacterial. 3.2 Describe mechanisms of action: - Cell-wall inhibitors (β-lactams - Vancomycin - Protein-synthesis inhibitors tetracyclines, - Aminoglycosides, - Macrolides, chloramphenicol), - Folate antagonists (sulfa, trimethoprim), - DNA inhibitors (fluoroquinolones), - Membrane disruptors (polymyxin). 3.3 Distinguish	- Define antimicrobial, antibiotic and antibacterial. - Explain mechanisms of action: - Cell-wall inhibitors (β-lactams - Vancomycin - Protein-synthesis inhibitors tetracyclines, - Aminoglycosides, - Macrolides, chloramphenicol), - Folate antagonists (sulfa, trimethoprim), - DNA inhibitors (fluoroquinolones), - Membrane	AMR guidelines. CLSI/EUCAST charts. Reference textbooks. Projector. Internet White board marker	- Classify 20 antibiotic samples by mechanism of action. - Perform disc-diffusion antibiotic sensitivity test on a bacterial isolate (introductory). - Read sensitivity plate; differentiate resistant from sensitive zones. - Calculate MIC from given broth microdilution results. - Investigate an antimicrobial use pattern in a Nigerian poultry farm; identify stewardship	Guide students to: - Classify 20 antibiotic samples by mechanism of action. - Perform disc-diffusion antibiotic sensitivity test on a bacterial isolate (introductory). - Read sensitivity plate; differentiate resistant from sensitive zones. - Calculate MIC from given broth microdilution results. - Investigate an antimicrobial use pattern in a Nigerian poultry farm; identify stewardship	Antibiotic samples. Disc diffusion kit. Sample plates. MIC data. Case study materials. AMR research data. Incubator Autoclave Water bath Petri dishes

	bacteriostatic and bactericidal action. 3.4 Distinguish narrow- and broad-spectrum antibiotics. 3.5 Discuss antifungal (azoles, polyenes, griseofulvin) and antiviral (limited) agents. 3.6 Describe AMR mechanisms: β-lactamase production, efflux pumps, target modification, target alteration. 3.7 Discuss antimicrobial stewardship and prudent-use principles. 3.8 Discuss the role of culture-and-sensitivity (CST) testing as the basis for rational therapy.	disruptors (polymyxin). • Distinguish bacteriostatic from bactericidal action. • Differentiate narrow- from broad-spectrum antibiotics. • Explain antifungal (azoles, polyenes, griseofulvin) and antiviral (limited) agents. • Explain AMR mechanisms: β-lactamase production, efflux pumps, target modification, target alteration. • Explain antimicrobial stewardship and prudent-use principles. • Explain the role of culture-and-sensitivity (CST) testing as the basis		opportunities. • Examine Nigerian AMR data for E. coli, Salmonella, Staphylococcus from published surveys.	opportunities. • Examine Nigerian AMR data for E. coli, Salmonella, Staphylococcus from published surveys.	
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		for rational therapy.				
GENERAL OBJECTIVE 4.0: Understand antiparasitics, anti-inflammatories, anaesthetics, hormones, vaccines and biologicals.						
5-6	4.1 Discuss anthelmintic classes: benzimidazoles, imidazothiazoles, macrocyclic lactones, salicylanilides, praziquantel. 4.2 List antiprotozoals: trypanocides (diminazene, isometamidium), coccidiostats (amprolium, monensin), babesiacides. 4.3 List ectoparasiticides: pyrethroids, amitraz, isoxazolines, avermectins. 4.4 Describe anthelmintic resistance as an emerging concern in small ruminants. 4.5 Distinguish NSAIDs (flunixin, meloxicam, ketoprofen) from	- List anthelmintic classes: benzimidazoles, imidazothiazoles, macrocyclic lactones, salicylanilides, praziquantel. - List antiprotozoals: trypanocides (diminazene, isometamidium), coccidiostats (amprolium, monensin), babesiacides. - Discuss ectoparasiticides: pyrethroids, amitraz, isoxazolines, avermectins. - Explain anthelmintic resistance as an emerging concern	Pictures of Drugs and Vaccine Reference textbooks. Projector. Internet White board marker	- Identify 15 antiparasitic products by class. - Identify 10 vaccine products; verify cold-chain requirements on labels. - Calculate Ringer's lactate therapy for a dehydrated calf.	Guide students to: - Identify 15 antiparasitic products by class. - Identify 10 vaccine products; verify cold-chain requirements on labels. - Calculate Ringer's lactate therapy for a dehydrated calf.	Drug samples. Vaccine samples. Fluid bags. Lyophilised vaccine, Diluent. Vaccine list. PPE

	corticosteroids (dexamethasone, prednisolone). 4.6 Explain analgesics (NSAIDs, opioids, local anaesthetics) and anaesthetics (xylazine, ketamine, propofol, isoflurane). 4.7 State reproductive hormones: oxytocin, prostaglandin F2α, GnRH, progesterone. 4.8 Explain vaccines: live attenuated, inactivated/killed, subunit, recombinant; identify Nigerian-licensed vaccines (NDV, Gumboro, FMD, anthrax, PPR, rabies). 4.9 Explain cold-chain principles for vaccine handling. 4.10 Discuss how to calculate fluid-therapy volume using crystalloids (normal saline, Ringer's lactate). 4.11 Discuss	in small ruminants. • Differentiate NSAIDs (flunixin, meloxicam, ketoprofen) from corticosteroids (dexamethasone, prednisolone). • Discuss analgesics (NSAIDs, opioids, local anaesthetics) and anaesthetics (xylazine, ketamine, propofol, isoflurane). • Discuss reproductive hormones: oxytocin, prostaglandin F2α, GnRH, progesterone. • Differentiate vaccines: live attenuated, inactivated/killed, subunit, recombinant; identify Nigerian-licensed vaccines				
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	vitamins/minerals supplements in livestock practice.	(NDV, Gumboro, FMD, anthrax, PPR, rabies). • Discuss cold-chain principles for vaccine handling. • Explain how to calculate fluid-therapy volume using crystalloids (normal saline, Ringer's lactate). • Explain vitamins/minerals supplements in livestock practice.				
GENERAL OBJECTIVE 5.0: Know correct drug and biological storage with cold-chain monitoring.						
7	5.1 Describe storage conditions: ambient (15–25 °C), refrigerated (2–8 °C), frozen (-20 °C), light-protected. 5.2 Discuss cold-chain principles for biologicals. 5.3 Discuss expiry dates and apply FEFO (first-expiry, first-out) rotation.	• Explain storage conditions: ambient (15–25 °C), refrigerated (2–8 °C), frozen (-20 °C), light-protected. • Explain cold-chain principles for biologicals. • Explain expiry dates and apply FEFO (first-expiry,	Pictures of storage cabinets, refrigerator. Sample records. Pharmacy SOPs. Reference textbooks. Projector. Internet White board marker	• Tour institutional pharmacy/laboratory • identify storage zones. • Read 10 drug labels; extract storage requirements. • Arrange 10 drug products in FEFO order. • Reconstitute a	Guide students to: • Tour institutional pharmacy/lab; identify storage zones. • Read 10 drug labels; extract storage requirements. • Arrange 10 drug products in FEFO order. • Reconstitute a lyophilized vaccine	Pharmacy access. Drug samples. Refrigerator. Lyophilized vaccine. Pharmacy register. Stock-taking forms. SOP template. PPE

5.4 Discuss shelf-life after opening for multi-dose vaccines. 5.5 Describe reconstitution of freeze-dried vaccines with correct diluent and use within 1–2 hours. 5.6 Discuss expired, recalled and damaged stock. 5.7 Discuss pharmacy records: receipt log, distribution log, stock card. 5.8 Describe a drug register for dispensed items. 5.9 Discuss controlled drugs (narcotic, psychotropic) in compliance with regulations. 5.10 Discuss how to dispose expired/damaged drugs per NESREA requirements (incineration). 5.11 Describe how to conduct stock-taking	first-out) rotation. • Explain shelf-life after opening for multi-dose vaccines. • Explain reconstitution of freeze-dried vaccines with correct diluent and use within 1–2 hours. • Explain expired, recalled and damaged stock. • Explain pharmacy records: receipt log, distribution log, stock card. • Explain a drug register for dispensed items. • Explain how to handle controlled drugs (narcotic, psychotropic) in compliance with regulations. • Explain how to dispose expired/damaged		lyophilized vaccine following protocol. • Enter records into a pharmacy register for one week's activity. • Conduct stock-taking for 10 products and identify reorder needs. • Compose a pharmacy SOP for receipt, storage and dispensing.	following protocol. • Enter records into a pharmacy register for one week's activity. • Conduct stock-taking for 10 products and identify reorder needs. • Compose a pharmacy SOP for receipt, storage and dispensing.	
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	and identify reorderpoints.	drugs per NESREA requirements (incineration). • Explain how to conduct stock-taking and identify reorder points.				
GENERAL OBJECTIVE 6.0: Understand drug-residue testing and verify withdrawal-period compliance.						
8	6.1 Define drug residue. 6.2 Explain withdrawal period as the interval between last drug administration and slaughter, milk or egg use. 6.3 Explain Maximum Residue Limit (MRL) as set by Codex Alimentarius and nationally enforced. 6.4 Explain Acceptable Daily Intake (ADI). 6.5 Explain residues of concern: antibiotics (tetracyclines, sulfonamides, β -lactams), anthelmintics (ivermectin,	• Explain drug residue. • Explain withdrawal period as the interval between last drug administration and slaughter, milk or egg use. • Explain Maximum Residue Limit (MRL) as set by Codex Alimentarius and nationally enforced. • Explain Acceptable Daily Intake (ADI). • Explain residues of concern:	Pictures of Residue test kits, Codex MRL table. Reference textbooks. Projector. Internet White board marker	• Conduct microbial inhibition residue test on a milk sample. • Identify withdrawal periods on 15 drug labels. • Calculate withdrawal end-dates for 10 hypothetical treatment scenarios. • Investigate Nigerian residue monitoring data through published reports. • Compose a withdrawal-verification SOP	Guide students to: • Conduct microbial inhibition residue test on a milk sample. • Identify withdrawal periods on 15 drug labels. • Calculate withdrawal end-dates for 10 hypothetical treatment scenarios. • Investigate Nigerian residue monitoring data through published reports. • Compose a withdrawal-verification SOP for a commercial dairy	Residue test kit. Drug labels. Calculation problems. Research materials. SOP template. PPE

	levamisole), hormones, anti-inflammatories. 6.6 Explain rapid screening with microbial inhibition tests (Delvotest, Charm test) and lateral-flow strips. 6.7 Outline confirmatory methods (HPLC, LC-MS/MS) typically referred to reference laboratories. 6.8 List appropriate samples: milk, urine, muscle, liver, kidney, egg, honey. 6.9 Explain withdrawal-period compliance through farm records. 6.10 State NAFDAC's role in national residue monitoring. 6.11 Explain the consequences of residue violations for trade, public health and AMR.	antibiotics (tetracyclines, sulfonamides, β-lactams), anthelmintics (ivermectin, levamisole), hormones, anti-inflammatories. • Explain rapid screening with microbial inhibition tests (Delvotest, Charm test) and lateral-flow strips. • Outline confirmatory methods (HPLC, LC-MS/MS) typically referred to reference laboratories. • List appropriate samples: milk, urine, muscle, liver, kidney, egg, honey. • Explain withdrawal-period compliance		for a commercial dairy farm.	farm.	
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		through farm records. • State NAFDAC's role in national residue monitoring. • Explain the consequences of residue violations for trade, public health and AMR.				
GENERAL OBJECTIVE 7.0: Know animal products and by-products and describe their commercial importance.						
9-10	7.1 Discuss animal products and animal by-products. 7.2 Discuss hides (cattle, buffalo) and skins (sheep, goat, calf) as primary inputs to leather. 7.3 Discuss the Nigerian leather industry through historical centres at Kano and Sokoto. 7.4 Describe hide/skin layered structure 7.5 Describe hide/skin collection at abattoir: flaying, trimming,	• Define animal products and animal by-products. • Distinguish hides (cattle, buffalo) from skins (sheep, goat, calf) as primary inputs to leather. • Explain the Nigerian leather industry through historical centres at Kano and Sokoto • Explain hide/skin layered structure: epidermis, dermis	Pictures of Hide/skin samples, Bone meal sample. Leather industry references. Reference textbooks. Projector. Internet White Board Marker	• Visit an abattoir to observe hide/skin recovery and curing. • Examine 5 sample hides/skins • Identify and grade defects. • Visit a tannery if available, or view a documentary of Nigerian tannery operations. • Inspect a bone meal sample; evaluate physical quality. • Investigate the	Guide students to: • Visit an abattoir to observe hide/skin recovery and curing. • Examine 5 sample hides/skins; identify and grade defects. • Visit a tannery if available, or view a documentary of Nigerian tannery operations. • Inspect a bone meal sample; evaluate physical quality. • Investigate the economic value of Nigerian leather	Transport. Hide/skin samples. Tannery materials/video. Bone meal sample. Research access. PPE

	salting/curing for preservation. 7.6 Discuss hide/skin defects: pre-mortem (brand, scratches, tick damage, ringworm, abscess) and post-mortem (flay cuts, putrefaction, salt damage). 7.7 Discuss other by-products: wool, goat hair, hoof, horn, bone meal, blood meal, meat-and-bone meal, tallow, gelatin. 7.8 Discuss edible offal (liver, kidney, heart, tripe) and inedible offal. 7.9 Discuss milk and dairy products (milk powder, whey). 7.10 Describe egg-product composition. 7.11 Discuss honey as an apicultural product. 7.12 Discuss the economic significance and value-chain potential of Nigerian by-products.	(papillary, reticular), hypodermis. • Explain hide/skin collection at abattoir: flaying, trimming, salting/curing for preservation. • Explain hide/skin defects: pre-mortem (brand, scratches, tick damage, ringworm, abscess) and post-mortem (flay cuts, putrefaction, salt damage). • List other by-products: wool, goat hair, hoof, horn, bone meal, blood meal, meat-and-bone meal, tallow, gelatin. • List edible offal (liver, kidney, heart, tripe) and inedible offal. • Explain milk and		economic value of Nigerian leather exports through NEPC data.	exports through NEPC data.	
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		dairy products (milk powder, whey). • Explain egg-product composition. • Explain honey as an apicultural product. • Explain the economic significance and value-chain potential of Nigerian by-products.				
GENERAL OBJECTIVE 8.0: Know basic physical and chemical quality testing on hides, skins, bone meal and other by-products.						
11-12	8.1 Discuss hide/skin quality parameters: grain quality, area, weight, thickness, defects, salt content. 8.2 Discuss grading of hides as Grade I (premium), Grade II, Grade III or reject. 8.3 Discuss pre-tanning physical tests: thickness (callipers), area (planimeter),	• Explain hide/skin quality parameters: grain quality, area, weight, thickness, defects, salt content. • Explain how to grade hides as Grade I (premium), Grade II, Grade III or reject. • Explain how to	Pictures of Hide/skin samples, Testing equipment. NAFDAC/SON standards. Reference textbooks. Projector. Internet White board marker	• Measure thickness of 5 sample hides/skins using callipers. • Determine moisture content of a bone meal sample by oven drying. • Determine ash content of bone meal using	Guide students to: • Measure thickness of 5 sample hides/skins using callipers. • Determine moisture content of a bone meal sample by oven drying. • Determine ash content of bone meal using muffle furnace.	Hide samples. Callipers, Weigh balance. Oven, muffle furnace. Titration kit. Refractometer, honey. Bone meal sample. Microbial swabs. SOP template.

	weight, moisture content (oven drying). 8.4 Describe pre-tanning chemical tests: salt content (titration), pH, moisture content, hide substance, ash. 8.5 Describe microbial swabbing of hides/skins for culture; recognise anthrax screening special considerations. 8.6 Discuss biosafety precautions for hide handling given historical Nigerian anthrax outbreaks linked to leather processing. 8.7 Describe how to test bone meal for protein ash, calcium-phosphorus ratio, moisture and microbial contamination. 8.8 Describe how to test blood meal for protein, moisture and ash.	perform pre-tanning physical tests: thickness (callipers), area (planimeter), weight, moisture content (oven drying). • Explain pre-tanning chemical tests: salt content (titration), pH, moisture content, hide substance, ash. • Explain microbial swabbing of hides/skins for culture; recognise anthrax screening special considerations. • Mention biosafety precautions for hide handling given historical Nigerian anthrax outbreaks linked to leather processing. • Explain how to test bone meal for		muffle furnace. • Titrate the salt content of a hide sample. • Measure honey moisture using a refractometer. • Grade 5 sample hides by visual inspection. • Demonstrate microbial swabbing of a hide sample. • Compose a hide-quality SOP for an abattoir.	• Titrate the salt content of a hide sample. • Measure honey moisture using a refractometer. • Grade 5 sample hides by visual inspection. • Demonstrate microbial swabbing of a hide sample. • Compose a hide-quality SOP for an abattoir.	PPE
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	8.9 Discuss how to examine feed-ingredient certification by NAFDAC and SON standards. 8.10 Describe measurement of honey moisture using a refractometer; assess HMF and sugar profile. 8.11 Discuss the laboratory's role in certifying Nigerian by-products for export.	protein (Kjeldahl, link to VLT 127), ash, calcium-phosphorus ratio, moisture and microbial contamination. • Explain how to test blood meal for protein, moisture and ash. • Explain feed-ingredient certification by NAFDAC and SON standards. • Explain measurement of honey moisture using a refractometer; assess HMF and sugar profile. • State the laboratory's role in certifying Nigerian by-products for export.				
GENERAL OBJECTIVE 9.0: Understand the regulatory framework and outline the technologist's role in compliance.						
13-15	9.1 Discuss NAFDAC	• Explain NAFDAC	Pictures of			

	mandate for veterinary medicinal products, biologicals, feeds and by-products. 9.2 Discuss the NAFDAC registration process (application, dossier, inspection, NAFDAC number). 9.3 Discuss FMARD and the Department of Veterinary and Pest Control Services. 9.4 Discuss NESREA as the chemical and waste regulator. 9.5 Discuss SON for product standards (including by-products). 9.6 Discuss VCN role in regulating veterinary practice and registering technologists. 9.7 Discuss NIPRD and NVRI as the major Nigerian veterinary RandD institutions. 9.8 Describe international frameworks:	mandate for veterinary medicinal products, biologicals, feeds and by-products. • Explain the NAFDAC registration process (application, dossier, inspection, NAFDAC number). • Explain FMARD and the Department of Veterinary and Pest Control Services. • Explain NESREA as the chemical and waste regulator. • Explain SON for product standards (including by-products). • Mention VCN role in regulating veterinary practice	Regulatory documents. International guidelines. Reference textbooks. Projector. Internet White board marker			
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	WOAH/OIE Terrestrial Manual, Codex Alimentarius (MRLs), ISO/IEC 17025. 9.9 Discuss NEPC and Leather Industries Manufacturers Association role in Nigerian leather sector. 9.10 Discuss compliance roles: routine testing, record-keeping, sample storage, audit trail. 9.11 Discuss career opportunities in veterinary pharmacy and by-product testing. 9.12 Discuss a complete testing protocol for an imported veterinary drug batch and a Nigerian-produced hide batch as the capstone. 9.13 Discuss the final assessment.	and registering technologists. • Mention NIPRD and NVRI as the major Nigerian veterinary RandD institutions. • Explain international frameworks: WOAH/OIE Terrestrial Manual, Codex Alimentarius (MRLs), ISO/IEC 17025. • Mention NEPC and Leather Industries Manufacturers Association role in Nigerian leather sector. • Explain compliance roles: routine testing, record-keeping, sample storage, audit trail. • List career opportunities in				
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		veterinary pharmacy and by-product testing. • Explain a complete testing protocol for an imported veterinary drug batch and a Nigerian-produced hide batch as the capstone. • Explain the final assessment.				
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						

ANIMAL ANATOMY AND PHYSIOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: ANIMAL ANATOMY AND PHYSIOLOGY	COURSE CODE: VLT 123	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 2 HOURS/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course designed to equip students with the knowledge and skills in veterinary laboratory technologist with a systematic understanding of the gross and microscopic anatomy and physiology of major Nigerian domestic species		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand anatomical terminology, planes and body cavities. 2.0 Know the integumentary, skeletal and muscular systems across species. 3.0 Know the cardiovascular and lymphatic systems. 4.0 Understand the respiratory system in mammals and birds. 5.0 Differentiate the digestive systems of ruminants, monogastrics and poultry. 6.0 Understand the urinary and reproductive systems. 7.0 Understand the nervous and endocrine systems. 8.0 Know special sense organs and compare key species differences. 9.0 Know anatomical and physiological knowledge to laboratory diagnostic samples and post-mortem orientation.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ANIMAL ANATOMY AND PHYSIOLOGY		COURSE CODE: VLT 123		CONTACT HOURS: 4 HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 2 HOURS/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course designed to equip students with the knowledge and skills of veterinary laboratory technologist with a systematic understanding of the gross and microscopic anatomy and physiology of major Nigerian domestic species						
GENERAL OBJECTIVE 1.0: Understand anatomical terminology, planes and body cavities.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define the following: i. Anatomy, ii. Physiology, iii. Histology iv. Embryology. 1.2 List the branches of anatomy: 1.3 Describe the anatomical position in veterinary species (standing on four limbs). 1.4 Define directional	• Define the following: — Anatomy, — Physiology, — Histology — Embryology. • List the branches of anatomy • Describe the anatomical position in veterinary species (standing on four limbs). • Define directional terms: —Cranial/caudal,	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Apply directional terms on a live dog and a cow. • Identify anatomical planes on a model. • Locate body cavities on a fresh carcass at the abattoir. • Locate serous membranes during dissection. • Apply directional-term	Guide students to: • Apply directional terms on a live dog and a cow. • Identify anatomical planes on a model. • Locate body cavities on a fresh carcass at the abattoir. • Locate serous membranes during dissection. • Apply directional-term	Live animals/models. Anatomical models. Carcass access. Dissection tools PPE. Logistics.

	terms: - Cranial/caudal, - Dorsal/ventral, - Medial/lateral, - Proximal/distal, - Superficial/deep - Rostral, - palmar/plantar, - Axial/abaxial. 1.5 List anatomical planes: - Sagittal (median), - Parasagittal, - Dorsal (frontal), - Transverse. 1.6 Describe body cavities: - Cranial, - Thoracic (mediastinum, pleural), - Abdominal, - Pelvic. 1.7 Explain serous membranes: - Pleura, - Pericardium, - Peritoneum. 1.8 Define veterinary anatomical nomenclature (NAV).	—Dorsal/ventral, —Medial/lateral, —Proximal/distal, —Superficial/deep, —Rostral, —palmar/plantar, —Axial/abaxial. - List anatomical planes: —Sagittal (median), —Parasagittal, —Dorsal (frontal), —Transverse. - Describe body cavities: —Cranial, —Thoracic (mediastinum, pleural), —Abdominal, —Pelvic. - Explain serous membranes: —Pleura, —Pericardium, —Peritoneum. - Define veterinary anatomical nomenclature (NAV).			
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GENERAL OBJECTIVE 2.0: Know the integumentary, skeletal and muscular systems across species.

2-3	2.1 Describe the integument skin layers. 2.2 Compare species variation: cattle/horse hide, pig skin, poultry feathers, dog/cat coat. 2.3 Describe mammary gland anatomy in different species 2.4 Describe the udder of dairy ruminants. 2.5 Discuss the axial skeleton. 2.6 Discuss appendicular skeleton 2.7 Describe Contrast skeletal differences 2.8 Classify joints fibrous, cartilaginous, synovial 2.9 Differentiate muscle types 2.10 Explain major muscle groups	• Describe the integument skin layers. • Compare species variation: cattle/horse hide, pig skin, poultry feathers, dog/cat coat. • Describe mammary gland anatomy in different species • Describe the udder of dairy ruminants. • Discuss the axial skeleton. • Discuss appendicular skeleton • Describe Contrast skeletal differences • Classify joints fibrous, cartilaginous, synovial • Differentiate muscle types • Explain major muscle groups associated with commercial meat cuts (loin, rib, round, brisket). • Explain sarcomere	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes.	• Identify major bones of cattle, sheep, dog and chicken on skeleton specimens. • Examine muscle-type histological slides under microscope. • Examine skin histological slides. • Inspect a fresh udder from the abattoir • Identify quarters and teats. • Locate common meat cuts on a beef carcass. • Aspirate synovial fluid from a hock joint of an abattoir specimen (demonstration). • Identify muscle groups	Guide the student to; • Identify major bones of cattle, sheep, dog and chicken on skeleton specimens. • Examine muscle-type histological slides under microscope. • Examine skin histological slides. • Inspect a fresh udder from the abattoir • Identify quarters and teats. • Locate common meat cuts on a beef carcass. • Aspirate synovial fluid from a hock joint of an abattoir specimen (demonstration). • Identify muscle groups	Skeletons. Microscope, slides. Fresh udder. Beef carcass. Joint specimens, animal, skin sample
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	associated with commercial meat cuts (loin, rib, round, brisket). 2.11 Explain sarcomere structure and the sliding-filament mechanism of contraction. 2.12 Explain diagnostic samples from these systems: skin scraping, hair pluck, muscle biopsy, joint (synovial) fluid.	structure and the sliding-filament mechanism of contraction. • Explain diagnostic samples from these systems: skin scraping, hair pluck, muscle biopsy, joint (synovial) fluid.				
GENERAL OBJECTIVE 3.0: Know the cardiovascular and lymphatic systems.						
4	3.1 Describe heart anatomy 3.2 Discuss species variation 3.3 Describe the cardiac cycle 3.4 Trace pulmonary and systemic circulation	• Describe heart anatomy • Discuss species variation • Describe the cardiac cycle • Trace pulmonary and systemic circulation pathways.	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Dissect a fresh cow or sheep heart • Identify all chambers and valves. • Identify major vessels in a fresh animal cadaver. • Examine a blood smear under	Guide the student to; • Dissect a fresh cow or sheep heart; identify all chambers and valves. • Identify major vessels in a fresh animal cadaver. • Examine a blood smear under microscope	Fresh hearts. Microscope. Abattoir access. Live animals. Syringe and needle. PPE Logistics.

	pathways. 3.5 Distinguish arteries (elastic, muscular, arteriole), capillaries, venules and veins (with valves). 3.6 Discuss major blood vessels 3.7 State blood component plasma (~55 %) and formed elements (erythrocytes, leukocytes, thrombocytes; ~45 %). 3.8 Explain blood functions 3.9 Explain haematopoiesis sites (bone marrow in adult mammals) 3.10 Describe the lymphatic system 3.11 Explain major lymph nodes used in meat inspection 3.12 Explain diagnostic samples	• Distinguish arteries (elastic, muscular, arteriole), capillaries, venules and veins (with valves). • Discuss major blood vessels • State blood component plasma (~55 %) and formed elements (erythrocytes, leukocytes, thrombocytes; ~45 %). • Explain blood functions • Explain haematopoiesis sites (bone marrow in adult mammals) • Describe the lymphatic system • Explain major lymph nodes used in meat inspection • Explain diagnostic samples		microscope • Identify cell types. • Locate major lymph nodes on a slaughtered cow at the abattoir. • Identify venipuncture sites on live animals . • Identify diagnostic samples	• Identify cell types. • Locate major lymph nodes on a slaughtered cow at the abattoir. • Identify venipuncture sites on live animals . • Identify diagnostic samples	
GENERAL OBJECTIVE 4.0: Understand the respiratory system in mammals and birds.						

5	4.1 Describe upper respiratory anatomy 4.2 Describe lower respiratory anatomy 4.3 Describe lung lobes across species 4.4 Describe the pleura (visceral, parietal) and pleural cavity. 4.5 Discuss the diaphragm (mammals) and abdominal muscles in respiration. 4.6 Explain breathing mechanics 4.7 Describe gas exchange at alveolar level: O₂ and CO₂ diffusion. 4.8 Explain O₂ transport via haemoglobin. 4.9 Explain species-specific respiratory rates	• Describe upper respiratory anatomy • Describe lower respiratory anatomy • Describe lung lobes across species • Describe the pleura (visceral, parietal) and pleural cavity. • Discuss the diaphragm (mammals) and abdominal muscles in respiration. • Explain breathing mechanics • Describe gas exchange at alveolar level: O₂ and CO₂ diffusion. • Explain O₂ transport via haemoglobin. • Explain species-specific respiratory rates • Explain respiratory samples.	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes.	• Dissect a fresh sheep or pig lung • Identify lobes, bronchi, pleura. • Examine a chicken lung • Identify air sacs. • Measure respiratory rate on 5 different live animals. • Identify trachea, larynx and bronchi on a fresh carcass. • Collect a nasal swab from a calm animal.	Guide students to: • Dissect a fresh sheep or pig lung • Identify lobes, bronchi, pleura. • Examine a chicken lung • Identify air sacs. • Measure respiratory rate on 5 different live animals. • Identify trachea, larynx and bronchi on a fresh carcass. • Collect a nasal swab from a calm animal.	Fresh lungs. Chicken Live animals. Carcass. Swab kit. PPE Logistics
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	4.10 Explain respiratory samples.					
GENERAL OBJECTIVE 5.0: Differentiate the digestive systems of ruminants, monogastrics and poultry.						
6-7	5.1 Describe general digestive system 5.2 Describe ruminant stomach 5.3 Discuss ruminant digestion 5.4 Describe non-ruminant herbivores 5.5 Describe poultry digestive system 5.6 Describe liver anatomy and species variation in lobes. 5.7 Describe the pancreas 5.8 Discuss dental formulas 5.9 Discuss digestive samples. 5.10 Describe anatomical knowledge to laboratory work	• Describe general digestive system • Describe ruminant stomach • Discuss ruminant digestion • Describe non-ruminant herbivores • Describe poultry digestive system • Describe liver anatomy and species variation in lobes. • Describe the pancreas • Discuss dental formulas • Discuss digestive samples. • Describe anatomical knowledge to laboratory work	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Dissect a fresh cow stomach from abattoir • Identify all four chambers and linings. • Examine a fresh chicken digestive tract • Identify crop, proventriculus, gizzard, intestines, caeca, cloaca. • Examine a dog digestive tract on cadaver. • Open a fresh gizzard • Observe grit and feed remnants. • Examine liver lobes in different species. • Identify teeth on cattle, sheep and dog skulls. • Collect rumen fluid for pH measurement.	Guide students to: • Dissect a fresh cow stomach from abattoir • Identify all four chambers and linings. • Examine a fresh chicken digestive tract • Identify crop, proventriculus, gizzard, intestines, caeca, cloaca. • Examine a dog digestive tract on cadaver. • Open a fresh gizzard • Observe grit and feed remnants. • Examine liver lobes in different species. • Identify teeth on cattle, sheep and dog skulls. • Collect rumen fluid for pH measurement.	Carcasses of animal; ruminants, monogastric and poultry stomach.. Sample bottles. pH meter. Logistics PPE
GENERAL OBJECTIVE 6.0: Understand the urinary and reproductive systems.						

8-9	6.1 Describe urinary anatomy 6.2 Discuss kidney species variation 6.3 Describe urinary samples and perform basic urinalysis. 6.4 Describe female reproductive anatomy 6.5 Discuss uterine types 6.6 Describe oestrous cycles 6.7 Explain gestation lengths 6.8 Describe male reproductive anatomy 6.9 Describe spermatogenesis in seminiferous tubules. 6.10 Describe poultry reproduction 6.11 Describe diagnostic samples 6.12 Describe reproductive diagnostics	• Describe urinary anatomy • Discuss kidney species variation • Describe urinary samples and perform basic urinalysis. • Describe female reproductive anatomy • Discuss uterine types • Describe oestrous cycles • Explain gestation lengths • Describe male reproductive anatomy • Describe spermatogenesis in seminiferous tubules. • Describe poultry reproduction • Describe diagnostic samples • Describe reproductive diagnostics (brucellosis, pregnancy diagnosis).	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Dissect fresh kidneys from multiple species; • Identify cortex, medulla, pelvis. • Dissect a fresh cow or sheep reproductive tract from abattoir. • Dissect a fresh bull or ram testis; • Identify epididymis. • Examine a fertile chicken egg; • Identify all structural components. • Examine a fresh hen reproductive tract. • Identify ovary with ova at different stages. • Collect a urine sample; • Perform basic urinalysis with reagent strips. • Prepare and observe a semen smear under microscope.	Guide the student to; • Dissect fresh kidneys from multiple species; • Identify cortex, medulla, pelvis. • Dissect a fresh cow or sheep reproductive tract from abattoir. • Dissect a fresh bull or ram testis; • Identify epididymis. • Examine a fertile chicken egg; • Identify all structural components. • Examine a fresh hen reproductive tract. • Identify ovary with ova at different stages. • Collect a urine sample; • Perform basic urinalysis with reagent strips. • Prepare and observe a semen smear under microscope.	Fresh kidneys, reproductive tracts. Testes, eggs. carcasses; poultry Urinalysis strips. Sample semen. Microscope. PPE Logistics
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	(brucellosis, pregnancy diagnosis).					
GENERAL OBJECTIVE 7.0: Understand the nervous and endocrine systems.						
10	7.1 Describe neuron structure 7.2 Describe CNS components 7.3 Describe: 12 pairs of cranial nerves and spinal nerves. 7.4 Describe autonomic divisions 7.5 Explain the nerve impulse (action potential). 7.6 List neurotransmitters 7.7 Describe meninges (dura, arachnoid, pia) and CSF (cerebrospinal fluid a key diagnostic sample). 7.8 Explain endocrine glands and key	• Describe neuron structure • Describe CNS components • Describe: 12 pairs of cranial nerves and spinal nerves. • Describe autonomic divisions • Explain the nerve impulse (action potential). • List neurotransmitters • Describe meninges (dura, arachnoid, pia) and CSF (cerebrospinal fluid a key diagnostic sample). • Explain endocrine glands and key hormones • Explain hormone action via receptor binding and signal transduction.	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Dissect a fresh sheep brain; identify major regions. • Identify cranial nerves on a brain specimen. • Examine spinal cord cross-section. • Locate thyroid, adrenal and pancreas on a fresh cadaver. • Examine endocrine slides under microscope. • Match 15 hormones to their physiological responses.	Guide the student to; • Dissect a fresh sheep brain; identify major regions. • Identify cranial nerves on a brain specimen. • Examine spinal cord cross-section. • Locate thyroid, adrenal and pancreas on a fresh cadaver. • Examine endocrine slides under microscope. • Match 15 hormones to their physiological responses.	Fresh brains. Spinal cord. Cadaver. Endocrine slides. Microscope. Hormone reference.

	hormones 7.9 Explain hormone action via receptor binding and signal transduction. 7.10 Describe neuroendocrine samples: CSF, serum hormone assay	Describe neuroendocrine samples: CSF, serum hormone assay				
GENERAL OBJECTIVE 8.0: Know special sense organs and compare key species differences.						
11	8.1 Describe eye anatomy 8.2 Describe accessory eye structures 8.3 Explain eye species variation 8.4 Describe ear anatomy 8.5 Explain ol factory organ (nasal mucosa) and gustatory organ 8.6 Explain tactile organs. 8.7 Summarise key	- Describe eye anatomy - Describe accessory eye structures - Explain eye species variation - Describe ear anatomy - Explain ol factory organ (nasal mucosa) and gustatory organ - Explain tactile organs. - Summarise key comparative anatomy differences across cattle, sheep, goat,	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	- Dissect a fresh cow or sheep eye; - Identify all structures. - Dissect a fresh ear; - Identify external and middle structures. - Examine tongues from different species. - Identify papillae. - Construct a comparative chart of 10 systems across 5 species. - Identify breed-specific features of Sokoto	Guide the student to; - Dissect a fresh cow or sheep eye; identify all structures. - Dissect a fresh ear; identify external and middle structures. - Examine tongues from different species; identify papillae. - Construct a comparative chart of 10 systems across 5 species. - Identify breed-specific features of Sokoto	Fresh eyes, ears. Tongues. Comparison chart. Breed photos.

	comparative anatomy differences across cattle, sheep, goat, pig, dog, cat, rabbit, chicken. 8.8 Describe anatomical features for laboratory sampling	pig, dog, cat, rabbit, chicken. • Describe anatomical features for laboratory sampling		Gudali, White Fulani, Sokoto Red goat. etc	Gudali, White Fulani, Sokoto Red	
GENERAL OBJECTIVE 9.0: Know anatomical and physiological knowledge to laboratory diagnostic samples and post-mortem orientation.						
12-15	9.1 Describe POST-MORTEM EXAMINATION: 60%external inspection, opening, systematic organ examination, sample collection. 9.2 Describe post-mortem orientation: identify organs correctly for proper sample submission. 9.3 Describe sample selectio at post-	• Describe POST-MORTEM EXAMINATION: 60%external inspection, opening, systematic organ examination, sample collection. • Describe post-mortem orientation: identify organs correctly for proper sample submission. • Describe sample selectio at post-mortem • Explain biosafety at post-mortem (anthrax	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Perform a supervised post-mortem on a rabbit or chicken. • Collect histopathology, microbiology and toxicology samples from post-mortem. • Complete a post-mortem report with proper anatomical orientation. • Match 15 laboratory tests to their anatomical/physiologic al basis. • Pass the final practical examination on dissection and sample	Guide student to; • Perform a supervised post-mortem on a rabbit or chicken. • Collect histopathology, microbiology and toxicology samples from post-mortem. • Complete a post-mortem report with proper anatomical orientation. • Match 15 laboratory tests to their anatomical/physiologica l basis. • Pass the final practical examination on	Carcasses. Sample collection kit. Report template. Test-system matrix. Examination rubric. Microscope,PPE

	mortem 9.4 Explain biosafety at post-mortem (anthrax suspects no necropsy; rabies suspects careful brain sampling). 9.5 Explain anatomical orientation in reporting.	suspects no necropsy; rabies suspects careful brain sampling). • Explain anatomical orientation in reporting.		collection. • Complete the final integrated written assessment.	dissection and sample collection.	
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						

VETERINARY LABORATORY PROCEDURE I

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE: Veterinary Laboratory Procedure I (Instrument, Instrumentation, Cold Chain and Reproductive Diagnostics)	COURSE CODE: VLT 124	CONTACT HOURS: 4 HOURS/WEEK
	CONTACT HOURS: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to enable students to acquire basic skills in veterinary laboratory procedures, diagnostics, specimen handling, cold chain management, and reproductive diagnostics.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the major equipment and Instruments in a Veterinary Laboratory 2.0 Know veterinary laboratory safety practices. 3.0 Know the procedure of sample handling. 4.0 Know aseptic techniques, sterilization, and waste disposal procedures. 5.0 Know implementation of cold chain management for vaccines, reagents, and samples. 6.0 Know basic veterinary laboratory diagnostic tests. 7.0 Know basic reproductive diagnostic procedures. 8.0 Know laboratory records and quality control standards		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE: VETERINARY LABORATORY PROCEDURE 1 (INSTRUMENT, INSTRUMENTATION, COLD CHAIN AND REPRODUCTIVE DIAGNOSTICS)			COURSE CODE: VLT 124		CREDIT UNIT: 4 HOURS/WEEK	
			CONTACT HOURS: 4		THEORETICAL: 1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
THEORETICAL CONTENT			PRACTICAL CONTENT			
GOAL: This course is designed to enable students to acquire basic skills in veterinary laboratory procedures, diagnostics, specimen handling, cold chain management, and reproductive diagnostics.						
General Objective 1.0: Know the major equipment and Instruments in a Veterinary Laboratory						
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1-2	1.1 List the major equipment and Instruments in the Veterinary Laboratory 1.2 list the equipment and instruments mentioned above 1.3 Explain the different types of laboratory glassware 1.4 State the uses of different laboratory wares. 1.5 Outline the uses of other laboratory equipment and Instrument 1.6 List cleaning reagents for	• Explain the major equipment and Instruments in the Veterinary Laboratory • Explain the equipment and instruments mentioned above • Explain the different types of laboratory glassware	Relevant charts etc Pictures of different glasswares in the laboratory	• Identify the equipment and instruments • Identify the different types of laboratory glassware e.g., beakers, test tubes, funnels, flask etc • Prepare cleaning reagents for laboratory wares.	Guide students to: • Identify the equipment and instruments mentioned above • Identify the different types of laboratory glassware e.g., beakers, test tubes, funnels, flask etc • Prepare	Laboratory equipment and instruments Glassware Cleaning reagents PPE H ₂ SO ₄ , alcohol etc. Water fittings, gas fittings, light fittings Grease, kipp's apparatus

	laboratory wares. 1.7 Describe maintenance of laboratory sensitive equipment	• State the uses of different laboratory wares. • Explain the uses of other laboratory equipment and Instrument • Explain cleaning reagents for laboratory wares. • Explain maintenance of laboratory sensitive equipment		• Clean laboratory wares Use cleaning agents	cleaning reagents for laboratory wares. Clean laboratory wares using cleaning agents	condensers Containers, Used or dirty sintered glass wares; Top loading balance, Analytical balance, Standard masses
General Objective 2.0: Know veterinary laboratory safety practices						
3-4	2.1 Explain laboratory hazards and safety symbols. 2.2 Mention laboratory safety rules and precautions. 2.3 Describe emergency procedures in the laboratory. 2.4 List laboratory waste	• Discuss laboratory hazards and safety symbols. • Discuss laboratory safety rules and precautions. • Discuss	Safety posters, hazard symbols, videos. Laboratory safety manual, First aid guide, fire safety materials. Waste disposal	• Demonstrate proper use of personal protective equipment (PPE). • Demonstrate safe laboratory conduct and	Guide students to: • Demonstrate proper use of personal protective equipment (PPE). • Demonstrate safe laboratory	PPE Laboratory benches, disinfectants, specimen containers. Fire extinguisher, first aid box, eye

	disposal methods.	emergency procedures in the laboratory. Describe laboratory waste disposal methods.	charts, color-coded bins. Internet Projector White board Marker	handling procedures. Demonstrate emergency response procedures in the laboratory. Dispose laboratory waste appropriately after segregation	conduct and handling procedures. Demonstrate emergency response procedures in the laboratory. Segregate and dispose laboratory waste appropriately	wash kit. Biohazard bags, color-coded waste bins Emergency door exit
General Objective 3.0: Know the procedure of sample handling.						
5-6	3.1 Explain types of veterinary specimens. 3.2 Explain principles of specimen collection. 3.3 Explain specimen labeling and documentation procedures. 3.4 Explain methods of specimen preservation and storage. 3.5 Explain procedures for specimen packaging and transportation.	- Describe types of veterinary specimens. - Discuss principles of specimen collection. - Describe specimen labeling and documentation procedures. - Discuss methods of specimen preservation and	Charts, specimen photographs, lecture notes. Multimedia projector. Sample forms, labels, markers. storage charts.	- Collect basic veterinary specimens correctly. - Document specimens appropriately. - Preserve and package specimens properly. Transport specimens following standard procedures.	Guide students to: - Collect basic veterinary specimens correctly. - Label and document specimens appropriately. - Preserve and package specimens properly. - Transport	Syringes, swabs, sample bottles. PPE Labels, request forms, markers. Preservatives, cooler boxes, ice packs. Transport containers, cold boxes

		storage. Describe procedures for specimen packaging and transportation.			specimens following standard procedures.	
General Objective 4.0: Know aseptic techniques, sterilization, and waste disposal procedures.						
7-8	4.1 Explain aseptic techniques in veterinary laboratories. 4.2 Explain methods of sterilization and disinfection. 4.3 Explain laboratory waste management procedures. Explain infection prevention and control measures.	- Describe aseptic techniques in veterinary laboratories. - Describe methods of sterilization and disinfection. - Discuss laboratory waste management procedures. Discuss infection prevention and control measures.	Charts, lecture notes. charts, disinfectant samples. Waste disposal charts, videos. PPE, safety manuals. Internet projector	- Demonstrate aseptic handling techniques. - Sterilize laboratory materials correctly. - Disinfect laboratory surfaces and equipment. Dispose laboratory waste properly.	Guide students to: - Demonstrate aseptic handling techniques. - Sterilize laboratory materials correctly. - Disinfect laboratory surfaces and equipment. Segregate and dispose laboratory waste properly.	Gloves, sterile swabs, disinfectants. Autoclave, hot air oven, disinfectants. Disinfectants, cleaning materials. Biohazard bags, color-coded bins. PPE Incinerator
General Objective 5.0: Know cold chain management for vaccines, reagents, and samples						
9-10	5.1 Explain the concept and importance of cold chain management. 5.2 Explain cold chain equipment and materials.	Discuss the concept and importance of cold chain management.	Charts, multimedia projector monitoring charts. Storage	- Monitor and record storage temperatures. - Package and transport	Guide students to: - Monitor and record storage temperatures. - Package and	Refrigerator, cooler box, vaccine carrier. Thermometer

	5.3 Explain temperature monitoring procedures. 4.4 Explain storage and transportation requirements for biological materials.	• Describe cold chain equipment and materials. • Describe temperature monitoring procedures. • Describe storage and transportation requirements for biological materials.	guidelines, manuals Internet	samples under cold conditions. • Maintain cold chain during laboratory activities.	transport samples under cold conditions. Maintain cold chain during laboratory activities.	Ice packs, cooler boxes, transport containers PPE Transport media
General Objective 6.0: Know basic veterinary laboratory diagnostic tests.						
11-12	6.1 Explain principles of veterinary diagnostic tests. 6.2 List common laboratory diagnostic methods. 6.3 Explain interpretation of laboratory results. 5.4 Explain quality control in laboratory testing.	• Explain principles of veterinary diagnostic tests. • Explain common laboratory diagnostic methods. • Explain interpretation of laboratory results.	Charts, lecture notes. charts, test kits. Sample result sheets. Quality control manuals Internet Projector	• Prepare specimens for laboratory testing. • Use microscope for basic examination. • Perform simple rapid diagnostic tests. • Record last results • Interpret test	Guide students to: • Prepare specimens for laboratory testing. • Use microscope for basic examination. • Perform simple rapid diagnostic tests. • Record test results correctly	Slides, stains, swabs. Microscope, slides, cover slips. Rapid test kits, reagents. Result sheets, laboratory records.

		• Explain quality control in laboratory testing.		results correctly.		
General Objective 7.0: Know basic reproductive diagnostic procedures						
13-14	7.1 Explain reproductive diagnostic procedures in livestock. 7.2 Explain methods of pregnancy detection. 7.3 Explain semen collection and evaluation procedures. 6.4 Explain handling of reproductive samples.	• Describe reproductive diagnostic procedures in livestock. • Describe methods of pregnancy detection. • Describe semen collection and evaluation procedures. • Explain handling of reproductive samples.	Charts, lecture notes. Multimedia projector, diagrams. Semen evaluation charts, manuals. Internet White board Marker	• Handle reproductive specimens correctly. • Carry out basic semen evaluation procedures. • Perform basic pregnancy diagnostic procedures. • Preserve reproductive samples properly • Transport reproductive samples properly.	Guide students to: • Handle reproductive specimens correctly. • Carry out basic semen evaluation procedures. • Perform basic pregnancy diagnostic procedures. • Preserve reproductive samples properly Transport reproductive samples properly.	Sample bottles, PPE. Microscope, slides, semen samples. Models, ultrasound images/charts. Cooler boxes, preservatives, labels. Artificial vagina, rapid test kits
General Objective 8.0: Know laboratory records and quality control standards.						

	8.1 Explain importance of laboratory records. 8.2 Explain procedures for laboratory documentation. 8.3 Explain principles of laboratory quality control. 8.4 Explain professional ethics in laboratory practice.	• Explain importance of laboratory records. • Describe the procedures for laboratory documentation. • Explain principles of laboratory quality control. Explain professional ethics in laboratory practice.	Record books, charts. Sample laboratory forms. Quality control	• Maintain laboratory records correctly. • Complete laboratory request and reporting forms. • Apply quality control measures during laboratory work.	Guide students to: • Maintain laboratory records correctly. • Complete laboratory request and reporting forms. • Apply quality control measures during laboratory work.	Sample bottles, PPE. Microscope, slides, semen samples. Models, ultrasound images/charts. Cold boxes, preservatives, labels.
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						

ANIMAL HANDLING AND WELFARE II

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE: ANIMAL HANDLING AND WELFARE II	COURSE CODE: VLT 125	CREDIT UNIT: 4 HOURS/WEEK
	CONTACT HOURS: 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 the Knowledge and skills required to safely and humanely handle, restrain and collect samples from domestic livestock species and laboratory animals.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand animal welfare principles and frameworks (Five Freedoms, Five Domains, OIE/WOAH standards). 2.0 Understand animal behaviour, body language and approach for safe handling. 3.0 Know safe handling and restraint of cattle. 4.0 Know safe handling and restraint of sheep and goats. 5.0 Know safe handling and restraint of pigs. 6.0 Know safe handling and restraint of poultry, rabbits and rodents. 7.0 Know species-specific venipuncture and blood sample collection. 8.0 Know collection of faecal, urine, milk, skin and swab samples. 9.0 Know transport welfare, biosecurity and ethical/legal considerations during sampling.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ANIMAL HANDLING AND WELFARE II			COURSE CODE: VLT 125		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 the knowledge and skills required to safely and humanely handle, restrain and collect samples from domestic livestock species and laboratory animals.						
GENERAL OBJECTIVE 1.0: Understand animal welfare principles and frameworks (Five Freedoms, Five Domains, OIE/WOAH standards).						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define animal welfare and animal handling. 1.2 Describe the FIVE FREEDOMS (FAWC, UK) 1.3 Describe the FIVE DOMAINS model; nutrition, environment, health, behaviour, mental state. 1.4 Describe	• Explain animal welfare and animal handling. • Explain the FIVE FREEDOMS (FAWC, UK) • Explain the FIVE DOMAINS model; nutrition, environment, health, behaviour, mental state. • Explain OIE/WOAH	Whiteboard, projector. Reference textbooks (Grandin — Improving Animal Welfare; OIE/WOAH Welfare standards). Welfare scoring sheets. 129 Internet, video			

	OIE/WOAH Terrestrial Animal Health Code Section 7 Animal Welfare. 1.5 Describe Nigerian legal framework Animal Diseases (Control) Act; cruelty to animals. 1.6 Describe the laboratory technologist's welfare responsibility ensuring sampling does not exceed permissible welfare burden. 1.7 Describe pre-sampling welfare assessment body condition, behaviour, age, pregnancy status, stress level, prior procedures. 1.8 Describe the 3Rs as they apply to live-animal sampling — Replacement	Terrestrial Animal Health Code Section 7 Animal Welfare. • Explain Nigerian legal framework Animal Diseases (Control) Act; cruelty to animals. • Explain the laboratory technologist's welfare responsibility ensuring sampling does not exceed permissible welfare burden. • Explain pre-sampling welfare assessment body condition, behaviour, age, pregnancy status, stress level, prior procedures. • Explain the 3Rs as they apply to live-animal sampling — Replacement (non-invasive	clips.			
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	(non-invasive alternatives), Reduction (minimum samples), Refinement (technique). 1.9 Describe documentation of welfare assessment.	alternatives), Reduction (minimum samples), Refinement (technique). • Explain documentation of welfare assessment.				
GENERAL OBJECTIVE 2.0: Understand animal behaviour, body language and approach for safe handling.						
2	2.1 Describe FLIGHT ZONE and POINT OF BALANCE concepts (Temple Grandin) 2.2 Describe NORMAL BEHAVIOUR vs STRESS RESPONSE in major species. 2.3 Describe species temperament 2.4 Describe approach principles 2.5 Describe handling environment	• Describe FLIGHT ZONE and POINT OF BALANCE concepts (Temple Grandin) • Describe NORMAL BEHAVIOUR vs STRESS RESPONSE in major species. • Describe species temperament • Describe approach principles • Describe handling environment • Describe social	Behaviour videos. Reference textbooks (Grandin). Stress physiology chart. Projector. Internet Whiteboard Marker	• Observe behaviour of cattle, sheep, goats, pigs and poultry at institutional farm • Practice approach to a cow respecting flight zone and point of balance. • Identify stress signs from photographs/videos of livestock. • Design a sampling environment that minimises stress.	Guide the student to: • Observe behaviour of cattle, sheep, goats, pigs and poultry at institutional farm • Practice approach to a cow respecting flight zone and point of balance. • Identify stress signs from photographs/videos of livestock. • Design a sampling environment that minimises stress.	Live animals. PPE Observation record sheet. Behaviour photos/videos. Design graphics protocol

	2.6 Describe social behaviour 2.7 Describe stress physiology 2.8 Describe handler safety 2.9 Describe Nigerian context dealing with semi-wild Sahel cattle, untrained free-range chickens.	behaviour • Describe stress physiology • Describe handler safety • Describe Nigerian context dealing with semi-wild Sahel cattle, untrained free-range chickens.				
GENERAL OBJECTIVE 3.0: Know safe handling and restraint of cattle.						
3-4	3.1 Describe cattle handling infrastructure 3.2 Describe moving cattle. 3.3 Describe restraint methods. 3.4 Describe applying a halter on cattle. 3.5 Describe tying knots halter knot, quick-release knot, rolling-hitch knot, bowline.	• Explain cattle handling infrastructure • Explain moving cattle. • Explain restraint methods. • Explain applying a halter on cattle. • Explain tying knots halter knot, quick-release knot, rolling-hitch knot, bowline. • Explain bull handling special	Cattle handling videos. Halter, ropes. Crush chute access. Reference textbooks. Projector. Internet. Pictures (Charts)	• Carryout tying halter and tying knots (rope work). • Place halter on a calm cow under supervision. • Move cattle along a race using flight zone principles. • Restrain a cow in crush chute • Expose jugular vein for blood draw (do not draw blood at this stage). • Restrain a calf for	Guide students to: • Carryout tying halter and tying knots (rope work). • Place halter on a calm cow under supervision. • Move cattle along a race using flight zone principles. • Restrain a cow in crush chute • Expose jugular vein for blood draw (do not draw blood at this stage).	Halter, ropes. Live cattle. Race, crush chute. Ear-tag and applicator. Scenario for downed cow. Nose Ring

	3.6 Describe bull handling special precautions 3.7 Describe calf handling. 3.8 Describe downed cow management 3.9 Describe chemical restraint. 3.10 Describe restraint challenges with nigerian indigenous breeds. 3.11 Describe handler positioning at the chute for blood draw.	precautions • Explain calf handling. • Explain downed cow management • Explain chemical restraint. • Explain restraint challenges with nigerian indigenous breeds. • Explain handler positioning at the chute for blood draw.		ear-tagging and dehorning. • Carryout casting of cattle. • Practise positioning for tail-vein and jugular blood draw on cattle. • Examine a downed cow (real or simulated) and arrange safe transport. • Restraint during manual milking of cows.	• Restrain a calf for ear-tagging and dehorning. • Carryout casting of cattle. • Practise positioning for tail-vein and jugular blood draw on cattle. • Examine a downed cow (real or simulated) and arrange safe transport. • Restraint during manual milking of cows.	
GENERAL OBJECTIVE 4.0: Know safe handling and restraint of sheep and goats.						
5	4.1 Describe HANDLING small ruminants herding into corner, hand-catching, leg-grabbing, neck-and-flank grip. 4.2 Describe moving	• Explain handling. • Discuss moving flocks. • Explain sheep • Explain goat restraint. • Explain kid/lamb handling. • Explain ram/buck.	Small ruminant handling videos. FAMACHA cards. Hoof trimming tools. Reference textbooks. Projector.	• Catch sheep using leg/flank technique. • Place sheep in sitting (rump) position for examination. • Handle goats using neck-and-flank grip. • Lift hoof of sheep and goat for	Guide students to: • Catch sheep using leg/flank technique. • Place sheep in sitting (rump) position for examination. • Handle goats using neck-and-flank grip. • Lift hoof of sheep	Live sheep, goats. FAMACHA cards. Hoof tools. Restraint pen. PPE Rope

	flocks. 4.3 Describe restraint for sheep 4.4 Describe restraint for goats 4.5 Describe kid/lamb handling cradling, leg-grabbing. 4.6 Describe ram/buck handling 4.7 Describe famacha scoring (links to OAP 326) 4.8 Describe foot examination 4.9 Describe Nigerian breeds 4.10 Describe positioning for jugular blood draw on small ruminants.	• Define FAMACHA scoring. • Explain foot examination. • List and explain Nigerian breeds. • Explain blood draw positioning. • Explain goat restraint. • Explain kid/lamb handling. • Explain ram/buck. • Explain FAMACHA scoring. • Discuss foot examination. • Explain Nigerian breeds. • Explain blood draw positioning.	Internet	examination. • Conduct FAMACHA scoring on 10 animals. • Position small ruminant for jugular blood draw (practice positioning only). • Handle a kid or lamb safely.	and goat for examination. • Conduct FAMACHA scoring on 10 animals. • Position small ruminant for jugular blood draw (practice positioning only). • Handle a kid or lamb safely.	
GENERAL OBJECTIVE 5.0: Know safe handling and restraint of pigs.						
6-7	5.1 Describe pig behaviour. 5.2 Describe moving pigs.	• Explain pig behaviour. • Explain moving	Pig handling videos. Pig handling charts	• Practise moving pigs using panels (with available pigs or	Guide students to: • Practise moving pigs using panels (with	Live pigs or models Pig snare. Panels.

	5.3 Describe restraint methods snare around upper jaw 5.4 Describe lifting piglets 5.5 Describe sow handling during farrowing 5.6 Describe boar handling 5.7 Describe sample collection positions 5.8 Describe DISEASE risk in handling pigs 5.9 Describe biosecurity 5.10 Describe ethical considerations.	pigs. • Explain restraint methods snare around upper jaw • Explain lifting piglets • Explain sow handling during farrowing • Explain boar handling • Explain sample collection positions • Explain disease risk in handling pigs • Explain biosecurity • Explain ethical considerations.	Pig snare, panels. Reference textbooks. Projector. Internet	simulation). • Lift piglet by hind limbs. • Apply pig snare on a pig (with supervisor). • Position pig for ear-vein blood sampling and cardiac puncture • Implement biosecurity protocol for pig handling.	available pigs or simulation). • Lift piglet by hind limbs. • Apply pig snare on a pig (with supervisor). • Position pig for ear-vein blood sampling and cardiac puncture • Implement biosecurity protocol for pig handling.	PPE.
GENERAL OBJECTIVE 6.0: Know safe handling and restraint of poultry, rabbits and rodents.						
8-9	6.1 Describe poultry handling 6.2 Discuss poultry restraint for sampling. 6.3 Describe poultry positions for blood sampling	• Explain poultry handling. • Explain poultry restraint. • Explain poultry blood positions. • Explain day-old chick handling.	Sampling animals. Restraint towels, boards. Reference textbooks. Projector. Internet	• Catch five 5 chickens correctly. • Position chicken for blood sampling (wing vein, heart, jugular, toes, comb) • Handle rabbit correctly; wrap in	Guide students to: • Catch and handle 5 chickens correctly. • Position chicken for blood sampling (wing vein, heart, jugular, toes, comb) • Handle rabbit	Live poultry, rabbits, and rodents. Restraint materials. (cages, clips, towels,) PPE.

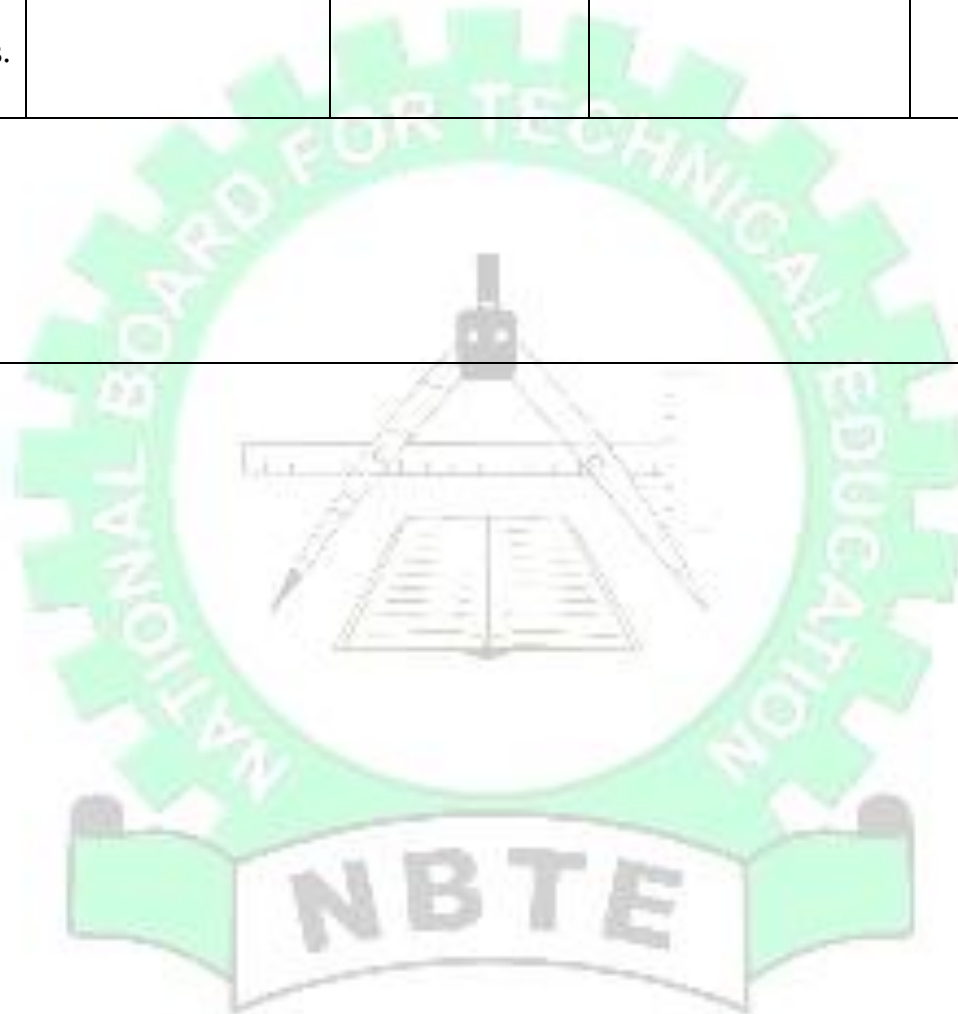
	6.4 Describe day-old chick handling 6.5 Describe rabbit handling 6.6 Describe rabbit restraint. 6.7 Describe rabbit blood sampling positions 6.8 Discuss rodent handling. 6.9 Describe rodent blood sampling positions 6.10 Explain the species-specific welfare considerations during handling and sampling.	• Explain rabbit handling. • Explain rabbit restraint. • Explain rabbit blood positions. • Explain rodent handling. • Explain rodent blood positions. • Explain welfare considerations.	White board Maker Charts	towel for restraint. • Position rabbit for blood sampling (marginal ear-vein, heart) • Handle mice, rats, guinea pigs correctly. • Position rodents for tail-vein blood sampling.	correctly; wrap in towel for restraint. • Position rabbit for blood sampling (marginal ear-vein, heart) • Handle mice, rats, guinea pigs correctly. • Position rodents for tail-vein blood sampling.	
GENERAL OBJECTIVE 7.0: Know species-specific venipuncture and blood sample collection.						
10-11	7.1 Explain indication for blood sampling 7.2 Explain collection tubes and additive. 7.3 Explain anticoagulant effects on tests. 7.4 Discuss site preparation.	• Discuss objectives. • Explain the collection tubes. • Describe anticoagulant effects. • Explain site preparation. • Describe needle	Sample collection tubes. Needles, syringes, Vacutainer kit. Antiseptics. Anatomy charts. Reference textbooks.	• Identify 5 different collection tubes by colour. • Practice needle insertion on rubber tube model. • Collect blood from a cow (jugular or tail vein) under direct	Guides students to: • Identify 5 different collection tubes by colour. • Practice needle insertion on rubber tube model. • Collect blood from a cow (jugular or tail	Collection tubes, needles, syringes. Live animals. Antiseptics. Labels. Transport box, cold pack.

	7.5 Describe needle selection 7.6 Describe venipuncture technique. 7.7 Describe species-specific venipuncture sites. 7.8 Describe sample labelling 7.9 Describe sample processing, preservation and transport to laboratory 7.10 Describe blood volume limits 7.11 Describe mistakes to avoid	selection. • Explain venipuncture technique. • List and explain species sites. • Describe labelling. • Explain transport. • Describe volume limits. • Discuss mistakes to avoid.	Projector.	supervision. • Collect blood from a sheep or goat (jugular). • Collect blood from a rabbit (marginal ear vein). • Collect blood from chicken (wing or brachial vein). • Collect blood from mouse or rat (tail vein). • Label and prepare samples for transport. • Identify haemolysis in sample.	vein) under direct supervision. • Collect blood from a sheep or goat (jugular). • Collect blood from a rabbit (marginal ear vein). • Collect blood from chicken (wing or brachial vein). • Collect blood from mouse or rat (tail vein). • Label and prepare samples for transport. • Identify haemolysis in sample.	PPE.
GENERAL OBJECTIVE 8.0: Know collection of faecal, urine, milk, skin and swab samples.						
12-13	8.1 Describe faecal sample collection 8.2 Discuss faecal handling 8.3 Explain urine sample collection 8.4 Define milk sample collection 8.5 Describe skin	• Explain faecal sample collection • Explain faecal handling • Explain urine sample collection • Explain milk sample collection • Explain skin	Swab types. Skin scraping tools. Sample CMT kit. Reference textbooks. Projector. internet	• Collect faecal sample directly from cow (rectal). • Collect voided faecal samples from sheep, goats, pigs, poultry. • Collect free-catch urine from a cat or dog (or small	Guide students to: • Collect faecal sample directly from cow (rectal). • Collect voided faecal samples from sheep, goats, pigs, poultry. • Collect free-catch urine from a cat or	Live animals. Sample containers, swabs. Skin scraping tools. CMT kit. Cold-chain materials.

	sample collection 8.6 Describe SWAB types and uses 8.7 Describe SWAB SITES 8.8 Explain biopsy (under veterinarian) 8.9 Explain semen collection, evaluation, preservation, sample collection (artificial vagina, electroejaculation) under veterinarian. 8.10 Explain MASTITIS-specific sampling using California Mastitis Test (CMT) kit (SGA 6 link). 8.11 Discuss Milk quality Tests	sample collection • Explain SWAB types and uses • Explain SWAB SITES • Explain biopsy (under veterinarian) • Explain semen collection, evaluation, preservation, sample collection (artificial vagina, electroejaculation) under veterinarian. • Explain MASTITIS-specific sampling using California Mastitis Test (CMT) kit (SGA 6 link). • Explain Milk quality Tests	lecture note white board marker	ruminant). • Collect milk sample aseptically from a cow. • Conduct skin scraping for ectoparasite identification. • Collect bacterial swab from nasal cavity of an animal. • Conduct California Mastitis Test (CMT) on a milking cow. • Handle all samples appropriately. • Prepare samples for transport with appropriate cold-chain (links to VLT 124 GO). • Collect sample for milk quality test	dog (or small ruminant). • Collect milk sample aseptically from a cow. • Conduct skin scraping for ectoparasite identification. • Collect bacterial swab from nasal cavity of an animal.	Labels. PPE. Alcohol gun - 68-70% ethanol Lactometer Resazurin Beta-lactam test strip Test tube Beaker
GENERAL OBJECTIVE 9.0: Know transport welfare, biosecurity and ethical/legal considerations during sampling.						
14-15	9.1 Describe transport welfare. 9.2 Describe species-	• Explain transport welfare. • Explain species-	OIE Transport Code. Biosecurity	• Conduct fitness-for-transport assessment on 5 animals.	Guide students to: • Conduct fitness-for-transport assessment	Animals. Biosecurity supplies.

specific transport. 9.3 Describe transport-related illness 9.4 Describe biosecurity during sampling 9.5 Describe hand hygiene frequency, technique. 9.6 Describe sharps handling. 9.7 Describe needle-stick injury 9.8 Describe zoonotic risk awareness during sampling. 9.9 Explain documentation of sampling. 9.10 Describe ethical considerations informed consent (farmer/owner), respecting limits of welfare burden. 9.11 Discuss legal considerations species-specific regulations	specific transport. • Explain transport-related illness • Explain biosecurity during sampling • Explain hand hygiene frequency, technique. • Explain sharps handling. • Explain needle-stick injury • Explain zoonotic risk awareness during sampling. • Explain documentation of sampling. • Explain ethical considerations informed consent (farmer/owner), respecting limits of welfare burden. • Explain legal considerations species-specific regulations • Explain forensic sample collection chain of custody for	SOPs. Sample documentation forms. Reference textbooks. Projector. Internet White board Marker	• Implement biosecurity protocol when entering a farm for sampling. • Dispose sharps and biohazard waste correctly. • Simulate needle-stick first-aid response. • Complete a chain-of-custody form for samples.	on 5 animals. • Implement biosecurity protocol when entering a farm for sampling. • Dispose sharps and biohazard waste correctly. • Simulate needle-stick first-aid response. • Complete a chain-of-custody form for samples.	Sharps container. First-aid kit. Chain-of-custody form. Examination rubric. Disinfectant PPE
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	9.12 Explain forensic sample collection chain of custody for legal purposes.	legal purposes.				
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						



FIELD AND POINT-OF-CARE VETERINARY DIAGNOSTICS

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE: FIELD AND POINT-OF-CARE VETERINARY DIAGNOSTICS	COURSE CODE: VLT 126	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with practical skills in field and point-of-care veterinary diagnostics for the detection and management of animal diseases.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the importance of field and point-of-care diagnostics in veterinary practice. 2.0 Know common field diagnostic tools and rapid test kits. 3.0 Know proper sample handling 4.0 Know basic point-of-care diagnostic tests on animals. 5.0 Know biosafety and biosecurity measures during diagnostic procedures. 6.0 Understand diagnostic results. 7.0 Know professionalism and teamwork during field activities.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE: FIELD AND POINT-OF-CARE VETERINARY DIAGNOSTICS			COURSE CODE: VLT 126		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL:1 HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with practical skills in field and point-of-care veterinary diagnostics for the detection and management of animal disease.						
General Objective 1.0: Understand the importance of field and point-of-care diagnostics in veterinary practice.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Define field and point-of-care veterinary diagnostics. 1.2 State the importance of field diagnostics in animal health management. 1.3 Explain areas where point-of-care diagnostics are applied in veterinary practice. 1.4 Differentiate between conventional laboratory diagnosis and point-of-care diagnosis. 1.5 List common field and point-of-care diagnostic tools. 1.6 Explain the advantages	•Explain field and point-of-care veterinary diagnostics. •Explain the importance of field diagnostics in animal health management. •Explain areas where point-of-care diagnostics are applied in veterinary practice. •Differentiate between	Whiteboard, marker, lecture notes, projector Charts, slides, textbooks Pictures, videos, case studies Comparative charts, diagrams Rapid test kits, thermometer s, glucometers, microscopes	•Identify common field diagnostic tools and kits. •Observe handling and storage of point-of-care diagnostic materials.	Guide students in: •Identify common field diagnostic tools and kits. •Observe handling and storage of point-of-care diagnostic materials.	Rapid test kits, PPE, portable diagnostic equipment Storage containers, sample kits, refrigerators/cool boxes Sample containers Syringes/needles/swabs

	and limitations of point-of-care diagnostics	conventional laboratory diagnosis and point-of-care diagnosis. • Explain common field and point-of-care diagnostic tools. • Explain the advantages and limitations of point-of-care diagnostics	Internet			
General Objective 2.0: Know common field diagnostic tools and rapid test kits.						
3-4	2.1 List common field diagnostic tools used in veterinary practice. 2.2 State the functions of rapid diagnostic test kits. 2.3 Explain the principles of operation of portable diagnostic devices. 2.4 State precautions in handling diagnostic tools and kits.	• Explain common field diagnostic tools used in veterinary practice. • Explain the functions of rapid diagnostic test kits. • Explain the principles of operation of portable	Charts, projector Lecture notes, videos Portable devices, manuals, safety guidelines	• Demonstrate proper use of field diagnostic tools. • Carry out simple rapid diagnostic tests. • Maintain diagnostic equipment properly.	Guide students in: • Demonstrate proper use of field diagnostic tools. • Carry out simple rapid diagnostic tests. • Maintain diagnostic equipment properly.	Thermometers, glucometers, rapid test kits animal samples. Storage cabinets, disinfectant Portable field microscopes/slides/cover slips PPE

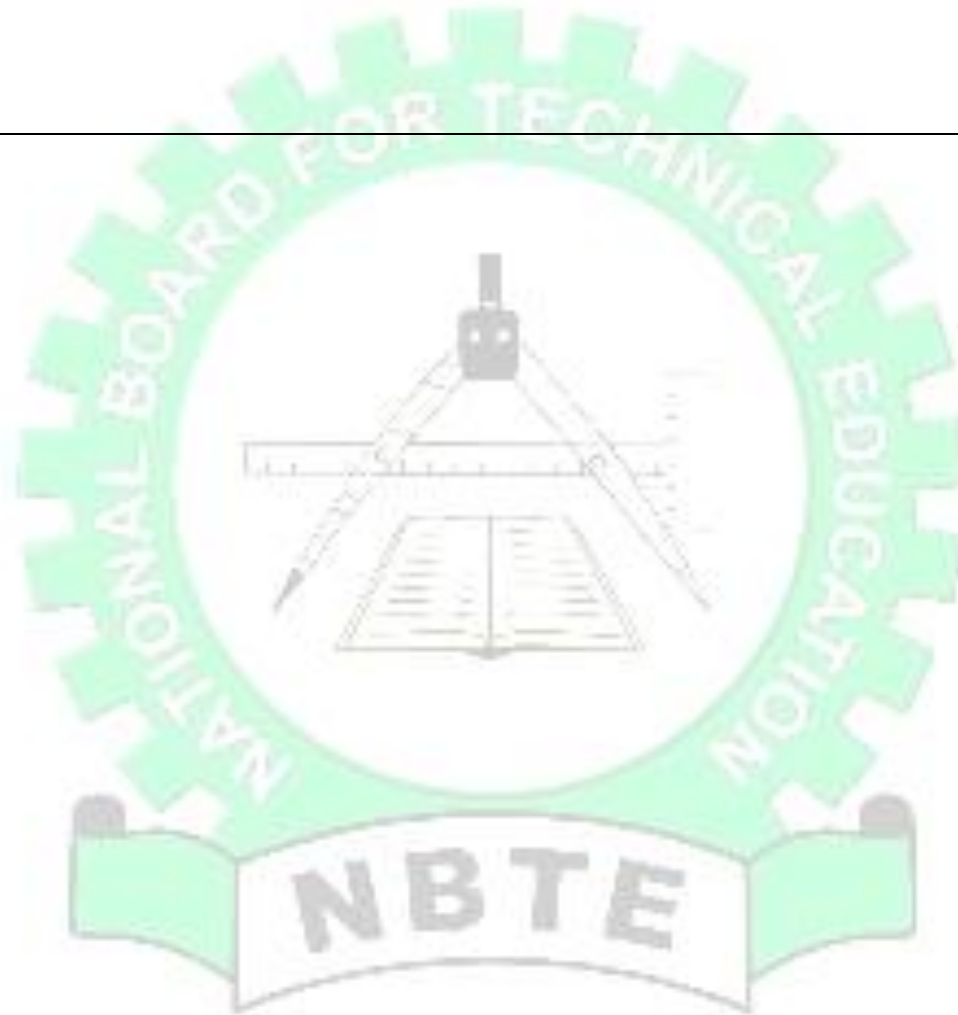
		diagnostic devices. • Explain precautions in handling diagnostic tools and kits.				
General Objective 3.0: Know proper sample handling						
4-5	3.1 List common veterinary specimens used for diagnosis. 3.2 Explain methods of specimen collection. 3.3 Explain specimen preservation and transportation procedures. 3.4 State precautions during specimen handling.	• Explain common veterinary specimens used for diagnosis. • Explain methods of specimen collection. • Explain specimen preservation and transportation procedures. • State precautions during specimen handling.	Charts, Pictures of: Specimen Containers Cold boxes PPE Lecture notes, diagrams Biosafety guidelines Internet Projector	• Collect basic veterinary specimens correctly. • Label specimens appropriately. • Package specimens appropriately. • Preserve specimens safely. • Transport specimens safely.	Guide students to: • Collect basic veterinary specimens correctly. • Label specimens appropriately. • Package specimens appropriately. • Preserve specimens safely. • Transport specimens safely.	Syringes, swabs, specimen bottles Labels, packaging materials Coolers, transport containers PPE
General Objective 4.0: Know basic point-of-care diagnostic tests on animals.						

6-7	4.1 Explain basic point-of-care diagnostic procedures. 4.2 Explain diseases commonly diagnosed using rapid tests. 4.3 Explain the interpretation of rapid test results.	• Explain basic point-of-care diagnostic procedures. • Explain diseases commonly diagnosed using rapid tests. • Explain the interpretation of rapid test results.	Lecture notes, videos Charts, textbooks Sample test results, slides Internet Projector	• Perform simple rapid diagnostic and other common laboratory tests on animal samples. • Read test results correctly.	Guide students to: • Perform simple rapid diagnostic and other common laboratory tests on animal samples. • Read test results correctly.	Rapid test kits, samples Test strips, manuals Record sheets, notebooks Logistics PPE
General Objective 5.0: Know biosafety and biosecurity measures during diagnostic procedures.						
8-9	5.1 Define biosafety and biosecurity in veterinary diagnostics. 5.2 State hazards associated with field diagnostics. 5.3 Explain infection prevention and control measures. 5.4 List methods of waste disposal in field diagnostics.	• Explain biosafety and biosecurity in veterinary diagnostics. • Explain hazards associated with field diagnostics. • Explain infection prevention and control measures. • Explain methods of	Safety posters, videos guidelines Waste bins, disposal charts	• Demonstrate correct use of personal protective equipment. • Practice safe handling and disposal of diagnostic waste. • Apply disinfection and sanitation practices	Guide students to: • Demonstrate correct use of personal protective equipment. • Practice safe handling and disposal of diagnostic waste. • Apply disinfection and sanitation practices	PPE Biohazard bags, sharps containers Disinfectants, hand sanitizers Autoclave Incinerator Hot air oven First aid box

		waste disposal in field diagnostics.				
General Objective 6.0: Understand and record diagnostic results accurately.						
10-12	6.1 Explain the importance of accurate diagnostic records. 6.2 Explain methods of recording diagnostic findings. 6.3 Identify common errors in result interpretation and recording.	• Discuss the role of documentation in veterinary practice. • Describe standard reporting formats. • Discuss causes and prevention of errors.	Lecture notes, charts Record templates, samples Case studies, examples Internet Projector	• Interpret field diagnostic results correctly. • Record and report findings accurately. • Maintain simple field diagnostic records.	Guide students to: • Interpret field diagnostic results correctly. • Record and report findings accurately. • Maintain simple field diagnostic records	Sample results, test kits Record books, forms Registers, computers Cloak room Printer
General Objective 7.0: Know professionalism and teamwork during field activities.						
13-15	7.1 Explain professionalism in veterinary field practice. 7.2 Explain the importance of teamwork in field diagnostics. 7.3 Explain communication skills required in field practice.	• Discuss ethics and professional conduct. • Discuss team roles during field investigations. • Discuss effective communication techniques.	Lecture notes, code of ethics Charts, case studies Videos, role-play materials Internet Projector			

COURSE ASSESSMENT:

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





INTRODUCTION TO VETERINARY PATHOLOGY**PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY****COURSE TITLE: INTRODUCTION TO VETERINARY PATHOLOGY****COURSE CODE: VLT 211****CONTACT HOURS: 3 HOURS/WEEK****CREDIT UNIT: 3****THEORETICAL: 1 HOURS/WEEK****YEAR: II SEMESTER: I****PRE-REQUISITE:****PRACTICAL: 2 HOURS/WEEK**

GOAL: This course is designed to equip students with knowledge and skills of general and systemic veterinary pathology with embedded units on apiculture (honey-bee) pathology and the rapidly growing area of climate-driven disease.

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

- 1.0 Comprehend the principles, branches and scope of veterinary pathology;
- 2.0 Understand cellular and tissue responses to injury: degeneration, necrosis, apoptosis;
- 3.0 Understand the inflammatory response, healing and repair;
- 4.0 Know circulatory disturbances and disturbances of growth (neoplasia);
- 5.0 Know how to conduct safe post-mortem examination on ruminants, monogastrics and poultry;
- 6.0 Know how to collect, fix and process specimens for histopathology;
- 7.0 Know gross and microscopic lesions of major Nigerian livestock diseases;
- 8.0 Know how to diagnose common honey-bee diseases and apply apiculture pathology;
- 9.0 Know climate-driven disease patterns and surveillance priorities.

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY PATHOLOGY		COURSE CODE: VLT 211		CONTACT HOURS: 3 HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: I		PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of general and systemic veterinary pathology with embedded units on apiculture (honey-bee) pathology and the rapidly growing area of climate-driven disease.						
GENERAL OBJECTIVE 1.0: Comprehend the principles, branches and scope of veterinary pathology.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define pathology. 1.2 Distinguish the branches of pathology. 1.3 Explain the different branches of pathology. 1.4 Define aetiology, pathogenesis, morphologic change and clinical significance 1.5 Outline the role of vet laboratory technician in	- Define pathology and veterinary pathology. - Differentiate general from systemic pathology. - Outline branches: anatomic, clinical, comparative. - Discuss aetiology, pathogenesis, morphologic changes and clinical significance. - Describe the role of	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	- Tour the institutional pathology laboratory - Identify equipment and zones. - Compose a workflow chart from specimen receipt to final report. - Apply BSL-2 entry/exit procedures.	Guide students to: - Tour the institutional pathology laboratory - Identify equipment and zones. - Compose a workflow chart from specimen receipt to final report. - Apply BSL-2 entry/exit procedures.	Lab access, Workflow template, PPE, Biosafety SOP, Institutional directory.

	pathology workflow 1.6 Explain ethical handling of carcasses and patient confidentiality.	the laboratory technician in pathology workflow. • Discuss ethical handling of carcasses and patient confidentiality.				
GENERAL OBJECTIVE 2.0: Understand cellular and tissue responses to injury: degeneration, necrosis, apoptosis.						
2-3	2.1 Distinguish reversible from irreversible cell injury. 2.2 List causes of cell injury. 2.3 Describe degenerative changes. 2.4 Distinguish necrosis types. 2.5 Differentiate necrosis from apoptosis. 2.6 Explain post-mortem changes. 2.7 Distinguish ante-mortem from post-mortem changes (critical for	• Discuss injury. • Discuss causes of cell injury: hypoxia, physical, chemical, infectious, immunologic, genetic, nutritional, ageing. • Describe necrosis types: coagulative, liquefactive, caseous, fat, fibrinoid, gangrenous. • Differentiate necrosis and apoptosis. • Discuss postmortem changes: rigor mortis, algor, livor, autolysis, putrefaction. • Discuss ante-mortem and post-mortem changes (critical for	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Identify degeneration, necrosis and apoptosis on histology slides. • Identify different necrosis types on gross specimens. • Distinguish post-mortem from ante-mortem changes on a carcass (or simulation).	Guide students to: • Identify degeneration, necrosis and apoptosis on histology slides. • Identify different necrosis types on gross specimens. • Distinguish post-mortem from ante-mortem changes on a carcass (or simulation).	Microscope, tissue slides, Preserved tissue specimens, Formalin, Carcasses, Report template. PPE.

	forensic pathology). 2.8 Explain gross and microscopic identification of postmortem changes.	forensic pathology). Changes • Discuss gross and microscopic identification of postmortem changes.				
GENERAL OBJECTIVE 3.0: Understand the inflammatory response, healing and repair.						
4	3.1 Define inflammation; outline its purpose. 3.2 Explain the cardinal signs of inflammation. 3.3 Explain acute, subacute and chronic inflammation. 3.6 Distinguish the different types of exudates. 3.7 Describe the healing process: regeneration, repair, scar formation. 3.8 Distinguish first vs second intention healing. 3.9 List factors affecting healing	• Discuss inflammation; outline its purpose. • Discuss the cardinal signs: rubor, calor, tumor, dolor, functio laesa. • Describe acute, subacute and chronic inflammation. • Discuss the different types of exudates: serous, fibrinous, purulent, haemorrhagic. • Describe first vs second intention healing. • Discuss factors affecting healing: nutrition, age, infection, foreign	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Identify acute and chronic inflammation on histology slides. • Identify granuloma on a TB-lesion specimen. • Distinguish 4 exudate types grossly. • Examine a healing wound at intervals and document healing progress.	Guide students to: • Identify acute and chronic inflammation on histology slides. • Identify granuloma on a TB-lesion specimen. • Distinguish 4 exudate types grossly. • Examine a healing wound at intervals and document healing progress.	Microscope, slides. TB specimens. Exudate samples. Wound, camera. PPE Scapel and scissors

		body, glucocorticoids.				
GENERAL OBJECTIVE 4.0: Distinguish circulatory disturbances and disturbances of growth (neoplasia).						
5-6	4.1 Define hyperaemia, congestion, haemorrhage, infarction, thrombosis, embolism. 4.2 Mention oedema types. 4.3 Explain shock. 4.4 Define DIC (Disseminated Intravascular Coagulation). 4.5 Define hypertrophy, hyperplasia, atrophy, metaplasia, dysplasia. 4.6 Define neoplasia; distinguish benign from malignant. 4.7 List common Nigerian veterinary tumours 4.8 Define staging and grading. 4.9 Explain the role of	• Discuss hyperaemia, congestion, haemorrhage, infarction, thrombosis, embolism. • Describe oedema types: inflammatory, non-inflammatory. • Discuss shock: hypovolaemic, cardiogenic, septic, anaphylactic. • Discuss DIC (Disseminated Intravascular Coagulation). • Differentiate hypertrophy, hyperplasia, atrophy, metaplasia, dysplasia. • Describe neoplasia; distinguish benign from malignant. • Describe common Nigerian veterinary tumours: cutaneous papilloma,	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Identify circulatory disturbances on tissue specimens. • Identify TVT cells on cytology smear. • Identify benign vs malignant features on tumour slides. • Compose a report on a tumour case.	Guide students to: • Identify circulatory disturbances on tissue specimens. • Identify TVT cells on cytology smear. • Identify benign vs malignant features on tumour slides. • Compose a report on a tumour case.	Specimens. Preserved specimens, TVT smear, Tumour slides, Report template, Microscope, PPE.

	histopathology in cancer diagnosis.	transmissible venereal tumour (TVT) in dogs, lymphoma in cattle (EBL), squamous cell carcinoma in eye. • Outline staging and grading. • Describe the role of histopathology in cancer diagnosis.				
GENERAL OBJECTIVE 5.0: Know how to conduct safe post-mortem examination on ruminants, monogastrics and poultry.						
7-8	5.1 Outline the purpose: <i>cause of death, diagnosis, epidemiology, forensic.</i> 5.2 Explain biosafety: PPE (overall, boots, gloves, mask, eye protection), zoonosis avoidance. 5.3 Explain standard post-mortem technique 5.4 Explain species-specific approaches to postmortem examination. 5.5 Identify common	• Describe the purpose: cause of death, diagnosis, epidemiology, forensic. • Discuss biosafety: PPE (overall, boots, gloves, mask, eye protection), zoonosis avoidance. • Describe standard post-mortem technique: external examination, opening, organ-by-organ examination, sampling. • Outline species-	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Conduct a complete post-mortem on a ruminant, pig and chicken (under supervision). • Compose the PM reports. • Apply correct PPE donning/doffing. • Manage carcass disposal per protocol. • Decontaminate instruments and facility post-PM.	Guide students to: • Conduct a complete post-mortem on a ruminant, pig and chicken (under supervision). • Compose the PM reports. • Apply correct PPE donning/doffing. • Manage carcass disposal per protocol. • Decontaminate instruments and facility post-PM.	Carcasses, PM kit, Report template, PPE, Disposal facility, Disinfectants, Incinerator, Fixatives, Sample containers, Swab sticks.

	lesions during systematic examination. 5.6 Describe a post-mortem report. 5.7 Explain carcass disposal. 5.8 Explain post-mortem decontamination of facility, instruments and PPE. 5.9 know when to refer to senior pathologist (notifiable diseases, forensic cases). 5.10 Explain notifiable diseases.	specific approaches: ruminants (rumen, abomasum), pigs (lymph nodes), poultry (oral examination, air sacs). • Explain common lesions during systematic examination. • Explain how to write a post-mortem report (PM No., signalment, history, gross findings, sample inventory, provisional diagnosis). • Discuss carcass disposal: incineration, burial, rendering per FMLD/NESREA guidelines. • Discuss post-mortem decontamination of facility, instruments and PPE. • Explain when to refer to senior pathologist (notifiable diseases, forensic cases). • Describe notifiable				
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		diseases: anthrax, FMD, rabies, CBPP, PPR, ASF, HPAI.				
GENERAL OBJECTIVE 6.0: Know how to collect, fix and process specimens for histopathology.						
9-10	6.1 Explain principles of specimen sampling. 6.2 List specimen-size guidelines 6.3 Distinguish different types of fixatives 6.4 Calculate fixative volume 6.5 Explain specimen labelling. 6.6 Outline tissue processing: dehydration (graded alcohol), clearing (xylene), wax infiltration, embedding. 6.7 Explain microtome sectioning (3–5 μm). 6.8 Explain tissue staining. 6.9 Explain mounting and cover-slipping. 6.10 Explain quality control of slides (artefacts, thickness,	• Discuss principles of specimen sampling: representative, lesion edge with normal tissue, multiple sites. • Describe specimen-size guidelines (1–2 cm thick, fit cassette). • Explain different types of fixatives: 10 % neutral buffered formalin (standard), Bouin's, Zenker's, alcohol. • Calculate fixative volume (10$\times$ tissue volume ; 24–48 h fixation). • Describe specimen labelling: patient ID, source, tissue, date, fixative. • Describe tissue processing: dehydration (graded alcohols), clearing	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Collect, fix and label specimens from a PM case. • Process tissues through dehydration, clearing, infiltration. • Embed tissues in paraffin. • Conduct microtomy and HandE staining. • Apply special staining for tissues. • Inspect finished slides for QC. • Maintain a specimen archive log.	Guide students to: • Collect, fix and label specimens from a PM case. • Process tissues through dehydration, clearing, infiltration. • Embed tissues in paraffin. • Conduct microtomy and HandE staining. • Apply special staining for tissues. • Inspect finished slides for QC. • Maintain a specimen archive log.	Specimens, fixative, Processor reagents, Embedding station, Microtome Stains, Microscope, Log book, PPE, Water bath, Slides, Cover slips.

	stain quality). 6.11 Assist in maintaining specimen and slide archive. 6.12 Identify modern automated processors.	(xylene), wax infiltration, embedding. • Explain microtome sectioning (3–5 µm). • Describe different types of stains: routine HandE; special stains (Gram, PAS, ZN, Masson's trichrome, silver). • Describe mounting and cover-slipping. • Discuss quality control of slides (artefacts, thickness, stain quality). • Describe specimen and slide archive. • Explain modern automated processors.				
GENERAL OBJECTIVE 7.0: Know gross and microscopic lesions of major Nigerian livestock diseases.						
11-12	7.1 Describe the gross and microscopic lesions of: i. Anthrax: dark, unclotted blood; splenomegaly; absent rigor; oedema.	• Describe the gross and microscopic lesions of: — Anthrax. — Blackleg. — FMD. — CBPP.	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes,	• Identify 10 disease lesions on gross specimens • Identify Negri bodies, ND inclusions on histology slides. • Compose 5 differential-diagnosis lists for given	Guide the students to: • Identify 10 disease lesions on gross specimens. • Identify Negri bodies, ND inclusions on histology slides. • Compose 5	Specimens images' Slides, Microscope, Differential diagnosis template (DDx),

ii. Blackleg (Clostridium chauvoei): muscle necrosis, gas, foul odour. iii. FMD: oral, foot vesicles; tongue ulceration. iv. CBPP: pleuropneumonia, marbled lung, fibrinous pleurisy. v. PPR: stomatitis, pneumonia, enteritis in small ruminants. vi. Rinderpest (historic) and trypanosomiasis (anaemia, lymph node enlargement). vii. Newcastle Disease: tracheitis, proventricular haemorrhages, intestinal lesions. 7.2 Describe Gumboro/IBDV: bursal swelling and necrosis.	— PPR. — TB. — ND. • Explain IBD. • Explain ASF. • Explain Rabies. • Explain pattern recognition. • Explain Differential diagnosis	etc.	lesions. • Profile 3 Nigerian disease outbreak cases.	differential-diagnosis lists for given lesions. • Profile 3 Nigerian disease outbreak cases	Case reports, PPE.
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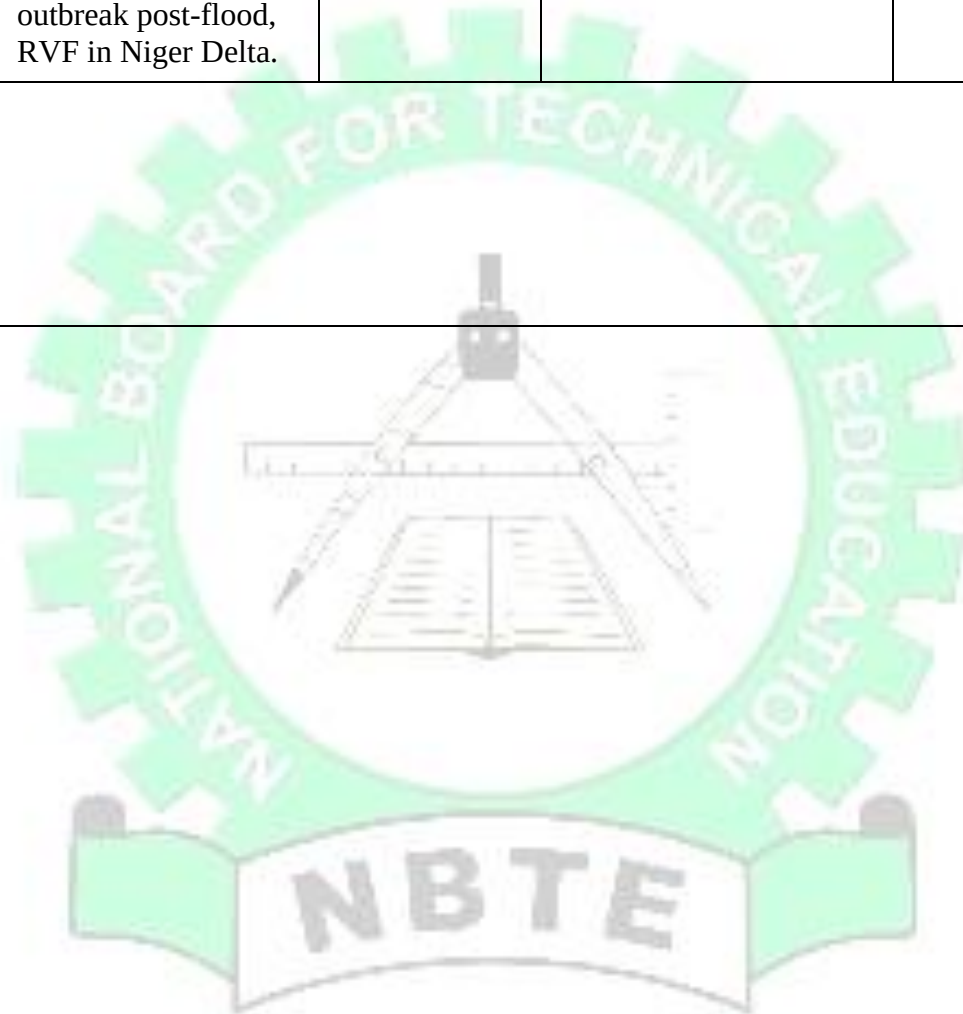
	7.3 Describe ASF: splenic infarction, lymph node haemorrhage, pulmonary oedema. 7.4 Describe Rabies: Negri bodies (microscopic). 7.5 Discuss differential diagnoses.					
GENERAL OBJECTIVE 8.0: Know how to diagnose common honey-bee diseases and apply apiculture pathology.						
13	8.1 Outline the Nigerian apiculture context: African honey bee 8.2 List major brood diseases 8.3 Mention adult bee diseases 8.4 List parasites of honey bee 8.5 List viral diseases of honey bee. 8.6 Apply field inspection: brood pattern, scale test, ropy test for AFB, sealed cells. 8.7 Mention the samples for	• Explain the Nigerian apiculture context: African honey-bee (<i>Apis mellifera adansonii</i>); economic importance; SGA Item 12 (apiculture mandate). • Discuss major brood diseases: American Foulbrood (<i>Paenibacillus larvae</i>), European Foulbrood (<i>Melissococcus plutonius</i>), sacbrood, chalkbrood. • Discuss adult bee diseases: Nosemosis (<i>Nosema apis</i>, N.	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Inspect a bee colony; assess brood pattern. • Conduct rope test for suspected AFB on larva sample. • Identify <i>Nosema</i> spores on microscope. • Conduct Varroa monitoring by sugar shake. • Compose a bee-disease diagnosis report.	Guide students to: • Inspect a bee colony; assess brood pattern. • Conduct rope test for suspected AFB on larva sample. • Identify <i>Nosema</i> spores on microscope. • Conduct Varroa monitoring by sugar shake. • Compose a bee-disease diagnosis report.	Bee colony, PPE, Larvae, Matchstick, Microscope, Slides, Sugar jar, Bees, Report template.

	laboratory diagnosis 8.8 Explain laboratory diagnosis: 8.9 Explain Varroa monitoring: sugar shake, alcohol wash, sticky board. 8.10 Outline organic-compliant treatments: oxalic acid, formic acid, drone-comb removal, requeening. 8.11 Explain the reporting requirements for notifiable bee diseases. 8.12 Explain Nigerian bee-pathology resources (NIRSAL, NEPC, NOAN apiculture group).	ceranae), Acarine (tracheal mite). • Discuss parasites: Varroa destructor mite, small hive beetle, wax moth. • Discuss viral diseases: deformed wing virus, sacbrood virus. • Explain field inspection: brood pattern, scale test, ropy test for AFB, sealed cells. • Explain samples collection for laboratory diagnosis: dead larvae, adult bees, wax/honey samples. • Explain laboratory diagnosis: microscopy for Nosema spores, culture for Paenibacillus, PCR for viruses. • Explain Varroa monitoring: sugar shake, alcohol wash, sticky board. • Explain organic-				
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		compliant treatments: oxalic acid, formic acid, drone-comb removal, requeening. • Explain the reporting requirements for notifiable bee diseases. • Explain Nigerian bee-pathology resources (NIRSAL, NEPC, NOAN apiculture group).				
GENERAL OBJECTIVE 9.0: Know climate-driven disease patterns and surveillance priorities.						
14-15	9.1 Explain climate-driven disease as an emerging issue. 9.2 List temperature-sensitive diseases. 9.3 List rainfall-/flood-sensitive diseases. 9.4 Explain drought-sensitive diseases. 9.5 Explain vector-range shifts 9.6 Mention Nigerian climate-disease hotspots. 9.7 Define climate-disease	• Discuss climate-driven disease as an emerging issue. • Discuss temperature-sensitive diseases: anthrax (<i>Bacillus anthracis</i> spores activated in wet-dry cycles), heat-stress mortality, theileriosis, anaplasmosis. • Describe rainfall-/flood-sensitive diseases: Rift Valley fever, leptospirosis, trypanosomiasis	Whiteboard, projector, Marker, Reference textbooks, Pathology atlas, Internet, Lecture notes, etc.	• Investigate the climate-disease link in a chosen Nigerian zone. • Compose a surveillance plan for an anthrax-prone area. • Examine 2 climate-disease case studies.	Guide students to: • Investigate the climate-disease link in a chosen Nigerian zone. • Compose a surveillance plan for an anthrax-prone area. • Examine 2 climate-disease case studies.	Zone data, Plan template, Case studies.

	surveillance. 9.8 Outline One Health framework for climate-disease response. 9.9 Apply integrated knowledge through 2 case studies: anthrax outbreak post-flood, RVF in Niger Delta.	(tsetse range expansion). • Discuss drought-sensitive diseases: nutritional deficiencies, increased predator-prey contact, displacement. • Describe vector-range shifts: ticks (<i>Rhipicephalus</i>, <i>Amblyomma</i>), mosquitoes, tsetse. • Describe Nigerian climate-disease hotspots: Sahel (anthrax), Niger Delta (RVF), Middle Belt (vector overlap). • Describe climate-disease surveillance: regular sampling, early warning, NIMET data integration. • Discuss One Health framework for climate-disease response. • Discuss integrated				
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		knowledge through 2 case studies: anthrax outbreak post-flood, RVF in Niger Delta.				
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						



INTRODUCTION TO VETERINARY MICROBIOLOGY

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO VETERINARY MICROBIOLOGY	COURSE CODE: VLT 212	CREDIT UNIT: 3 HOURS/WEEK
	CONTACT HOURS: 3	THEORETICAL: 1HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of the basic principles of veterinary microbiology, including the identification and diagnosis of microorganisms associated with diseases in monogastric and ruminant animals.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept, scope, and history of veterinary microbiology. 2.0 Understand the general characteristics and classification of microorganisms of veterinary importance. 3.0 Understand microbial growth patterns and the factors affecting microbial growth. 4.0 Understand Koch's postulates and their relevance in disease causation and diagnosis. 5.0 Understand basic techniques for the isolation, culture, and identification of microorganisms. 6.0 Understand the common microbial diseases affecting monogastric and ruminant animals. 7.0 Understand specimen collection, handling, and laboratory procedures for diagnosis in monogastric and ruminant animals. 8.0 Understand the principles of laboratory diagnosis of bacterial, viral, fungal, and parasitic infections in food and companion animals. 9.0 Understand biosafety, aseptic techniques, and infection control practices in veterinary microbiology laboratories.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY MICROBIOLOGY			COURSE CODE: VLT 212		CREDIT UNIT: 3 HOURS/WEEK	
			CONTACT HOURS: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 2HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of the basic principles of veterinary microbiology, including the identification and diagnosis of microorganisms associated with diseases in monogastric and ruminant animals.						
General Objective 1.0: Understand the concept, scope, and history of veterinary microbiology.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Define veterinary microbiology. 1.2 Explain the scope and branches of veterinary microbiology. 1.3 Trace the historical development of microbiology. 1.4 Explain notable scientists and their contributions to microbiology. 1.5 Explain the importance of veterinary microbiology in monogastric and ruminant animal health.	• Explain veterinary microbiology. • Discuss the scope and branches of veterinary microbiology. • Discuss the historical development of microbiology. • Discuss notable scientists and their contributions to microbiology. • Describe the importance of veterinary microbiology in monogastric and ruminant animal health.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, History notes, Pictures of scientists, Animal disease manuals, WHO/FAO publications,			

			etc.			
General Objective 2.0: Understand the general characteristics and classification of microorganisms of veterinary importance						
2-3	2.1 Classify microorganisms into bacteria, viruses, fungi, and parasites. 2.2 Explain the general characteristics of microorganisms. 2.3 Differentiate between prokaryotic and eukaryotic microorganisms. 2.4 Explain the importance of microorganisms in animal health and disease.	• Discuss the classification of microorganisms • Describe the general characteristics of microorganisms. • Describe prokaryotic and eukaryotic microorganisms. • Discuss the importance of microorganisms in animal health and disease.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.	• Observe the morphology of common microorganisms. • Identify microorganisms based on shape and arrangement.	Guide students to: • Observe the morphology of common microorganisms. • Identify microorganisms based on shape and arrangement.	Microscope, Permanent slides, Laboratory manual, charts, Hand lens, Wire loop, Bunsen burner, Immersion oil.
General Objective 3.0: Understand microbial growth patterns and the factors affecting microbial growth.						
4-5	3.1 Explain microbial growth – asexual reproduction 3.3 Explain the phases of microbial growth curve. 3.4 Explain factors affecting microbial growth. 3.5 Explain methods of microbial control. 3.6 Explain different methods of sterilization	• Discuss microbial growth – asexual reproduction • Discuss the phases of microbial growth curve. • Discuss factors affecting microbial growth. • Explain methods of microbial control. • Describe different	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.	• Conduct flaming • Conduct autoclaving • Make use of hot air oven • Lyophilization	Guide students to: • Conduct flaming • Conduct autoclaving • Make use of hot air oven • Lyophilization	Autoclave, Hot air oven, Bunsen burner, Wire loop.

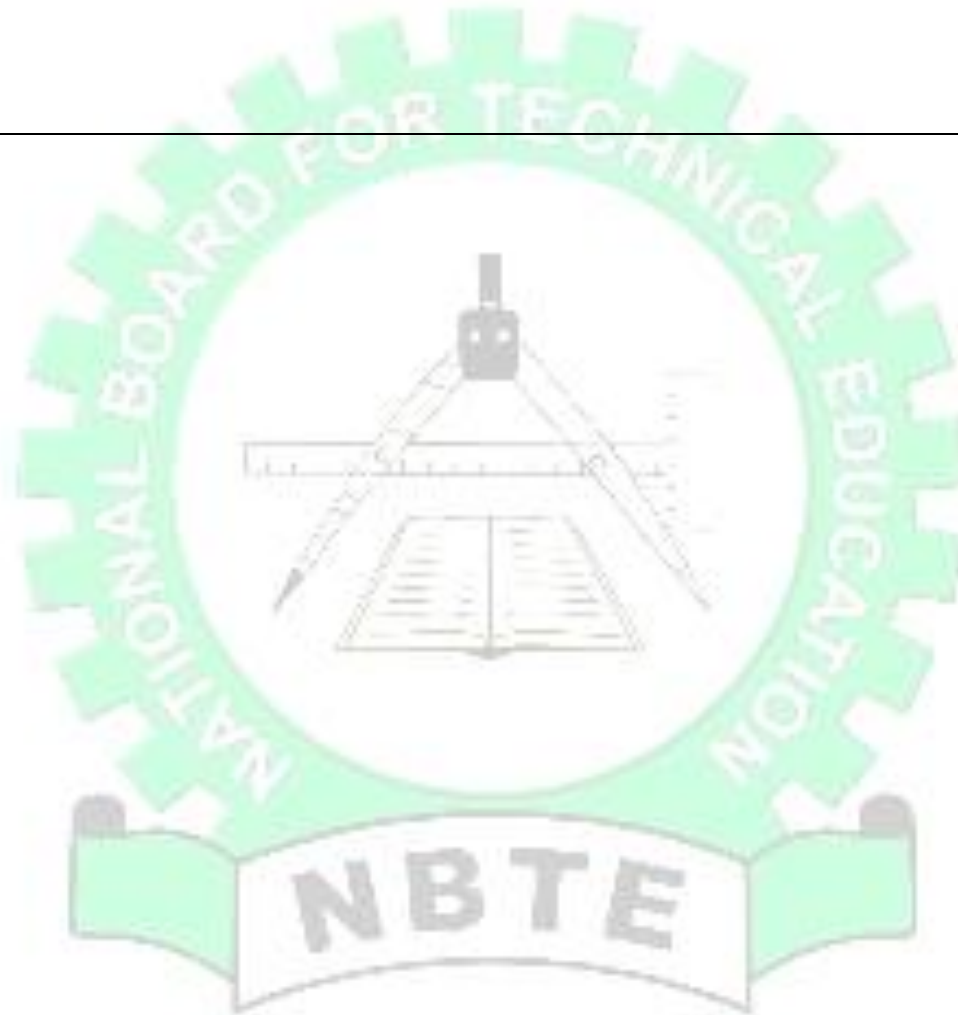
		methods of sterilization (Moist heat, dry heat, radiation, and chemical)				
General Objective 4.0: Understand Koch's postulates and their relevance in disease causation and diagnosis.						
6	4.1 Explain Koch's postulates. 4.2 Explain the importance of Koch's postulates in veterinary microbiology. 4.3 Explain their limitations of Koch's postulates.	• Explain the principles of Koch's postulates. • Discuss the importance of Koch's postulates in veterinary microbiology. • Explain exceptions and modern applications.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.			
General Objective 5.0: Understand basic techniques for the isolation, culture, and identification of microorganisms.						
7-8	5.1 Explain principles of microbial isolation and culture. 5.2 Explain staining techniques used in microbiology – Gram staining, Lactophenol cotton blue 5.3 Mention methods of microbial identification.	• Discuss principles of microbial isolation and culture. • Describe staining techniques used in microbiology – Gram staining • Describe methods of microbial identification.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.	• Demonstrate streak method of microbial growth on culture media. • Carry out Gram staining.	Guide students to: • Demonstrate streak method of microbial growth on culture media • Carry out Gram staining.	Culture media, Distilled water, Incubator, Water bath, Petri dish, Wire loop, Bunsen burner, Autoclave, Gram staining reagents, Slides, PPE.

General Objective 6.0: Understand the common microbial diseases affecting monogastric and ruminant animals.						
9	6.1 Describe common microbial diseases of monogastric animals. 6.2 Describe common microbial diseases of ruminants. 6.3 Explain signs, transmission, and prevention of microbial diseases.	• Discuss common microbial diseases of monogastric animals. • Discuss common microbial diseases of ruminants. • Describe signs, transmission, and prevention of microbial diseases.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.			
General Objective 7.0: Understand specimen collection, handling, and laboratory procedures for diagnosis in monogastric and ruminant animals.						
10-13	7.1 Explain principles of specimen collection and handling. 7.2 List different types of veterinary specimens. 7.3 Explain laboratory procedures for diagnostic investigations.	• Discuss principles of specimen collection and handling. • Describe different types of veterinary specimens. • Discuss laboratory procedures for diagnostic investigations	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.	• Demonstrate specimen collection techniques. • Demonstrate proper labeling, packaging, and transport of samples.	Guide students to: • Demonstrate specimen collection techniques. • Demonstrate proper labeling, packaging, and transport of samples.	Syringes/needles, Swabs, Sample bottles, Labels, Scalpel blade, PPE.
General Objective 8.0: Understand the principles of laboratory diagnosis of bacterial, viral, fungal, and parasitic infections in food and						

companion animals.						
12	8.1 Explain diagnostic principles for bacterial infections. 8.2 Explain diagnostic principles for viral infections. 8.3 Explain diagnostic principles for fungal and parasitic infections. 8.4 Differentiate diagnostic approaches for food and companion animals.	• Discuss diagnostic principles for bacterial infections. • Discuss diagnostic principles for viral infections. • Discuss diagnostic principles for fungal and parasitic infections. • Describe diagnostic approaches for food and companion animals.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.			
General Objective 9.0: Understand biosafety, aseptic techniques, and infection control practices in veterinary microbiology laboratories.						
14-15	9.1 Explain biosafety principles in microbiology laboratories. 9.2 Explain aseptic techniques used in microbiology. 9.3 Explain infection prevention and control measures. 9.4 Describe laboratory hazards and safety signs.	• Discuss biosafety principles in microbiology laboratories. • Describe aseptic techniques used in microbiology. • Describe infection prevention and control measures. • Describe laboratory hazards and safety signs.	Whiteboard, Marker, Lecture notes, Multimedia projector, Charts, PowerPoint slides, Microbiology textbooks, Charts, etc.	• Demonstrate proper handwashing and aseptic techniques. • Use personal protective equipment correctly. • Practice laboratory waste disposal procedures.	Guide students to: • Demonstrate proper handwashing and aseptic techniques. • Use personal protective equipment correctly. • Practice laboratory waste disposal procedures	Soap, Disinfectants, PPE, Waste bins, Sharps container, Running water.

COURSE ASSESSMENT:

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



INTRODUCTION TO VETERINARY SURGERY

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO VETERINARY SURGERY	COURSE CODE: VLT 213	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of the principles and laboratory-support role of veterinary surgery.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Comprehend the principles, scope and ethics of veterinary surgery; 2.0 Know surgical instruments; 3.0 Apply sterilisation, disinfection and aseptic technique; 4.0 Know how to prepare theatre, patient and surgeon for operation; 5.0 Know basic anaesthesia and patient monitoring; 6.0 Understand common Nigerian veterinary surgical procedures and the assistant's role; 7.0 Apply wound management, suturing principles and bandaging; 8.0 Know surgical biopsy specimens for laboratory diagnosis; 9.0 Understand post-operative care, theatre administration and records.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY SURGERY			COURSE CODE: VLT 213		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of the principles and laboratory-support role of veterinary surgery.						
GENERAL OBJECTIVE 1.0: Comprehend the principles, scope and ethics of veterinary surgery.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define veterinary surgery. 1.2 Distinguish elective, emergency and prophylactic surgery. 1.3 Explain the surgical-team structure: surgeon, surgical assistant, anaesthetist, scrub nurse, technologist. 1.4 Describe the role of VCN regulatory framework. 1.5 Explain informed	• Explain veterinary surgery. • Differentiate elective, emergency and prophylactic surgery. • Discuss the surgical-team structure: surgeon, surgical assistant, anaesthetist, scrub nurse, technologist. • Describe the role of VCN) regulatory framework.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Visit the institutional surgery facility; identify zones. • Identify members of a surgical team and their roles • Profile a Nigerian Veterinary Teaching hospital/Clinics. • Demonstrate the ethical considerations of livestock surgery. • Apply welfare.	Guide student to; • Visit the institutional surgery facility; identify zones. • Identify members of a surgical team and their roles • Profile a Nigerian Veterinary Teaching hospital/Clinics. • Demonstrate the ethical considerations of livestock surgery.	Surgery access, Team chart, Hospital data, Discussion materials, Live animals.

	consent and ethical considerations. 1.6 Explain 3Rs (Replacement, Reduction, Refinement) for surgical-research animals. 1.7 Describe welfare-centered surgical practice 1.8 Explain theatre design: clean/dirty zones, ventilation, lighting, scrub area, recovery. 1.9 Explain the common Nigerian veterinary surgery contexts: livestock (castration, dystocia), companion animals (sterilisation, wound), wildlife.	• Discuss informed consent and ethical considerations. • Discuss 3Rs (Replacement, Reduction, Refinement) for surgical-research animals. • Describe welfare-centered surgical practice • Discuss theatre design: clean/dirty zones, ventilation, lighting, scrub area, recovery. • Describe the common Nigerian veterinary surgery contexts: livestock (castration, dystocia), companion animals (sterilisation, wound), wildlife.			• Apply welfare.	
GENERAL OBJECTIVE 2.0: Know surgical instruments.						
2-3	2.1 List surgical instruments by function: cutting (scalpels, scissors),	• Mention and explain surgical instruments. • Explain surgical instruments	Charts. Projector white board,	• Identify common surgical instruments and suture materials; ➤ Handles.	Guide student to; • Participate during surgical instrument identification.	Instrument sets, Lap pack, Castration pack, C-section pack,

	grasping (forceps, towel clamps), haemostatic (Kelly, mosquito, Crile), retracting (Senn, Gelpi), needle holders (Mayo-Hegar, Olsen-Hegar), suturing (needles, suture material). 2.2 Describe Maintenance of surgical instrument; inspection, lubrication, sharpening and replacement. 2.3 Describe set up pack	maintenance • Explain set up pack	Marker Text books, Internet. Lecture note, etc.	➤ Scissors. ➤ Forceps. ➤ Needles. ➤ Sutures. ➤ Retractors, etc. • Set up a basic surgical pack (laparotomy), castration pack and caesarean section pack • Maintain instruments. • Inspect instruments for damage.	• Participate during surgical pack set-up • Participate during surgical instrument inspection • Participate during surgical instrument maintenance	Cleaning supplies, Inspection checklist, Mouth guard, Stomach Tube, Virginal Speculum.
GENERAL OBJECTIVE 3.0: Apply sterilisation, disinfection and aseptic technique.						
4-5	3.1 Define sterilization methods; physical, chemical and radiation 3.2 Mention disinfectant and method of application; pre, intra and post-surgical procedure.	• Discuss disinfection • Define sterilization, explain the methods of sterilization • List disinfectant • Explain method of applying disinfectant • Explain aseptic technique • Explain hand	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Identify common disinfectants: phenol, alcohol (70 % isopropanol), chlorine (sodium hypochlorite), iodophors (povidone-iodine), chlorhexidine, glutaraldehyde, hydrogen peroxide • Operate the autoclave;	Guide student to; • Identify autoclave. • Participate in preparation. • Participate in scrub. • wear glove correctly. • Participate in cleaning.	Autoclave, Indicators, Disinfectants, Scrub solution, Sink, Gowns, Hot Air, Oven, First Aid Box, Drugs cabinet,

	3.3 Outline disinfectant as high, intermediate and low level disinfectant. 3.4 Describe hand hygiene	hygiene		load and verify cycle indicators. • Prepare surgical-disinfectant solutions correctly. • Conduct surgical hand scrub for 5 minutes. • Apply closed-gloving technique. • Apply theatre cleaning per protocol. • Apply aseptic technique throughout setup and surgery		Cleaning supplies, PPE.
GENERAL OBJECTIVE 4.0: Know how to prepare theatre, patient and surgeon for operation.						
6	4.1 Explain pre-operative preparation: starvation (small animals 12 h; ruminants 24–48 h), water restriction, examination, blood profile. preparation: hair removal, multiple scrub cycles with chlorhexidine and alcohol.	• Describe theatre preparation • Define draping. • List types of draping. • Explain draping techniques • Discuss the role of technologist in theatre preparation • Explain back-up instruments. • Explain theatre log and instrument count (before, during,	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Prepare a model patient for surgery: position, clip, scrub, drape. • Conduct gowning and gloving for self and surgeon. • Maintain instrument count. • Apply contamination response. • Maintain theatre log entry. • Apply patient positioning: dorsal,	Guide the student to; • Conduct theatre preparation. • Participate during gowning. • Conduct count. • Observe response. • Apply restrain and immobilization. • Participate in pre-operative preparation • Apply draping with sterile drapes;	Patient/model, Gowns, Count sheet, Log book, PPE.

	4.2 Define draping. 4.3 List types of draping. 4.4 List draping techniques 4.5 List the role of technologist in theatre preparation 4.6 Explain back-up instruments. 4.7 .Explain theatre log and instrument count (before, during, after).	after).		ventral, lateral, sternal recumbency. • Prepare backup. • Apply draping with sterile drapes; aperture drape.	aperture drape • Maintain theatre log and instrument count (before, during, after).	
GENERAL OBJECTIVE 5.0: Know basic anaesthesia and patient monitoring.						
7-8	5.1 Distinguish general anesthesia from sedation, local/regional anesthesia. 5.2 Explain general anesthesia with examples 5.3 Explain local anesthesia with examples 5.4 Explain inhalational anaesthesia with examples 5.5 Explain intubation.	• Describe anesthesia. • Differentiate between local and general anaesthesia with examples • Describe injectable anaesthesia • Describe inhalational anaesthesia • Discuss local anaesthesia • Describe intubation	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Identify pre-anaesthetic agents: atropine, acepromazine, xylazine. • Identify injectable anaesthetics: ketamine, propofol, thiopentone, alfaxalone. • identify inhalational anesthetics: isoflurane, sevoflurane (rarely in Nigerian field). • Identify local anesthetics: lidocaine,	Guide students to: • Identify pre-anaesthetic agents: atropine, acepromazine, xylazine. • Identify injectable anaesthetics: ketamine, propofol, thiopentone, alfaxalone. • identify inhalational anesthetics: isoflurane, sevoflurane (rarely	Sedated animal, Pulse oximeter, Monitor, Simulation kit, Record sheet, Anaesthetic agents, Monitoring equipment.

	5.6 Explain emergency response. 5.6 List common anaesthetic emergencies; hypotension, hypothermia and shock.		bupivacaine; species-specific dose. • Identify regional techniques: epidural (cattle, dogs), brachial plexus block. • Identify endotracheal intubation: equipment, technique, safety. • Apply monitoring: heart rate, respiration, temperature, mucous membrane colour, capillary refill time. • Recognise common anaesthetic emergencies: apnoea, hypotension, hypothermia, cardiac arrest. • Apply emergency response: ventilation, fluid bolus, atropine, adrenaline. • Maintain anaesthesia record (every 5 min).	in Nigerian field). • Identify local anesthetics: lidocaine, bupivacaine; species-specific dose. • Identify regional techniques: epidural (cattle, dogs), brachial plexus block. • Identify endotracheal intubation: equipment, technique, safety. • Apply monitoring: heart rate, respiration, temperature, mucous membrane colour, capillary refill time. • Recognise common anaesthetic emergencies: apnoea, hypotension, hypothermia, cardiac arrest.	
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					• Apply emergency response: ventilation, fluid bolus, atropine, adrenaline. • Maintain anaesthesia record (every 5 min).	
GENERAL OBJECTIVE 6.0: Understand common Nigerian veterinary surgical procedures and the assistant's role.						
9-10	6.1 Describe castration: cattle, sheep, goat, pig, dog, cat. 6.2 Explain caesarean section in cattle and small ruminants. 6.3 Describe dehorning, disbudding methods. 6.4 Describe rumenotomy (for foreign-body removal in cattle). 6.5 Describe ovariohysterectomy ("spay") in bitches, queens. 6.7 Describe orchiectomy in dogs and cats. 6.8 Describe laceration	• Explain castration. • Mention and explain the type of castration. • Explain C-section. • Explain dehorning. • Explain rumenotomy. • Explain OHE. • Explain orchiectomy. • Explain suturing. • Explain fracture. • List type of Fracture • Explain ophthalmic. procedures • List common ophthalmic procedures	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Assist (under supervision) at 2 surgical procedures. • Apply instrument handling: pass, receive, count. • Conduct tissue retraction. • Apply swabbing and sutuuctioning. • Compose post-procedure report. • Apply tissue handling principles: minimal trauma, moistening, careful retraction	Guide the student to; • Participate as assistant in some surgical procedures. • Participate in handling. • Conduct retraction accurately • Participate during swabbing correctly. • Guide composition.	Surgery access, Instruments, Retractors, Swabs, Suction, Report template, PPE, Live animal or model.

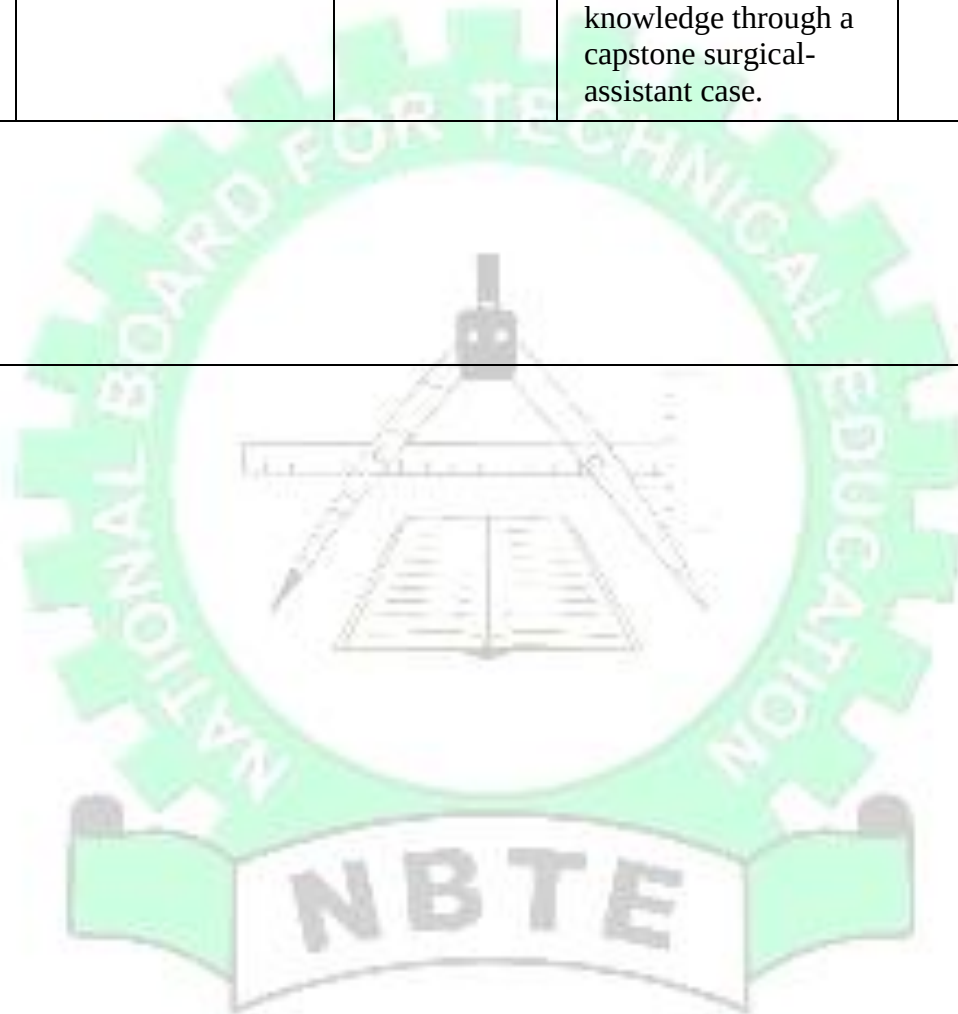
	repair, wound suturing. 6.9 Discuss limb fracture repair (briefly). 6.10 Discuss ophthalmic surgery: third-eyelid prolapse, entropion.					
GENERAL OBJECTIVE 7.0: Apply wound management, suturing principles and bandaging.						
11-12	7.1 Describe wounds: clean, clean-contaminated, contaminated, dirty. 7.2 Describe wound assessment: extent, contamination, tissue viability 7.3 Discuss, wound preparation: lavage, debridement, haemostasis... 7.4 Describe suture patterns: simple interrupted, simple continuous, Ford interlocking, mattress (horizontal, vertical), subcuticular, purse-	• Classify wounds. • Explain suturing. • List the types of suture pattern • Enumerate alternatives sutures • Explain closure. • Explain wound dressing. • Explain bandaging. • Explain drains • Define open wound. • List the types of open wound.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Apply assessment. • Apply preparation. • Identify 5 suture patterns on simulation pad. • Apply Robert Jones bandage on a limb (model or live). • Apply Penrose drain placement (simulation). • Manage a simulated open wound for 3 days. • Identify complications in simulated cases. • Identify alternatives • Apply closure, dressing, bandaging and drain..	Guide student to; • Observe suturing. • conduct bandaging. • Apply drain. • Conduct wound management. • Guide recognition.	Suture pad, Bandage supplies, Drain materials, Wound simulation cases.

	string. 7.5 Discuss suturing on a simulation pad. 7.6 Describe staples and tissue glue alternatives.			• Manage open wound • Recognise complications • Apply primary closure, delayed primary closure, secondary closure, second-intention healing. • Apply wound dressing: gauze, bandage, tertiary layer. • Apply bandaging types: Robert Jones, modified Robert Jones, splint, cast. • Apply drains: passive (Penrose) and active (Jackson-Pratt). • Manage open wounds with daily lavage and dressing. • Recognise complications: dehiscence, infection, seroma, abscess		
GENERAL OBJECTIVE 8.0: Know surgical biopsy specimens for laboratory diagnosis.						
13	8.1 Distinguish biopsy types: excisional, incisional, punch, needle, fine-needle	• Define biopsy • Distinguish types. • Define fixation.	Whiteboard, Projector, Charts.	• Coordinate procedure • Handle a simulated biopsy specimen from collection to	Guide student to; • Participate in handling biopsy samples	Specimen, Fixative, FNA materials, Diff-Quik kit,

	aspiration (FNA). 8.2Describe specimen handling: immediate fixation in 10 % NBF (10× volume). 8.3Describe specimen labelling: patient, source, site, suture markers, date. 8.4Discuss FNA preparation: smear on slide, air-dry or fix with alcohol. 8.5Discuss Application of rapid stain (Diff-Quik) for cytology. 8.6Describe the important of Submitting biopsy with clinical history and pathology requisition	• Mention the importance of labelling. • Explain fine needle aspirate FNA. • List the importance of sample submission with history. • Recognize role.	Projector white board, Marker Text books, Internet, Lecture note, etc.	submission. • Apply FNA smear preparation. • Apply Diff-Quik staining. • Compose a pathology requisition. • Maintain a specimen submission log. • Identify common surgical biopsy contexts: skin tumour, lymph node, mammary mass, internal organ at laparotomy	• Observe FNA. • participate in staining procedures • Guide composition. • Supervise log.	Requisition form, Log book, Computer, Printer.
GENERAL OBJECTIVE 9.0: Understand post-operative care, theatre administration and records.						
14-15	9.1 Describe post-operative monitoring: vitals, recovery, pain assessment	• Explain monitoring. • Define pain. • Identify complication. • Define nursing.	Charts. Projector white board, Marker	• Apply post-operative monitoring on a patient. • Compose discharge instructions.	Guide student to; • Conduct monitoring. • Guide composition. • Participate in record	Patient access, Discharge template, Register, Log book,

9.2 Discuss pain management: NSAIDs, opioids (legal restrictions), local blocks. 9.3 Describe post-operative complications: infection, dehiscence, ileus, anaesthetic delay, haemorrhage. 9.4 Describe post-operative nursing: feeding, water, exercise restriction, suture removal at 10–14 d. 9.5 Compose discharge instructions for clients. 9.6 Explain theatre register: date, patient, procedure, surgeon, anaesthetist, complications 9.7 Discuss theatre stock management: inventory, expiry, reorder.	• Explain the importance of maintain a register in the clinic or teaching hospital • Define wound. • Explain discharge template.	Text books, Internet. Lecture note, etc.	• Maintain theatre register and inventory. • Submit capstone case log. • Sit the final integrated practical and written assessment. • Identify complication • Manage waste • Apply surveillance • Identify complications • Maintain register. • Define inventory • Apply post-operative monitoring: vitals, recovery, pain assessment. • Maintain theatre register: date, patient, procedure, surgeon, anaesthetist, complications. • Apply theatre stock management: inventory, expiry, reorder. • Manage clinical waste: sharps, biohazard, anaesthetic gas scavenging. • Apply infection-	management. • Receive submission. • Administer assessment.	Assessment animal.
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				control surveillance. • Apply integrated knowledge through a capstone surgical-assistant case.		
COURSE ASSESSMENT Course Work: 10% Tests: 10% Practical: 40% Examination: 40% Total: 100%						



VETERINARY LABORATORY PROCEDURES II

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: VETERINARY LABORATORY PROCEDURES II	COURSE CODE: VLT 214	CREDIT UNIT: 3 HOURS/WEEK
	CONTACT HOURS: 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 of veterinary laboratory equipment maintenance, glassware fabrication, LIMS, and digital surveillance systems.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles and applications of laboratory equipment maintenance; 2.0 Understand the principles of vacuum production and applications in veterinary laboratories; 3.0 Understand different types of glasses used as laboratory ware; 4.0 Understand Laboratory Information Management Systems (LIMS); 5.0 Understand digital surveillance systems in veterinary laboratory practice; 6.0 Understand laboratory biosafety, waste management, and quality assurance; 7.0 Know professional ethics, documentation, and reporting skills in veterinary laboratories.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: VETERINARY LAB PROCEDURES II: EQUIPMENT, MAINTENANCE, LIMS and DIGITAL SURVEILLANCE			COURSE CODE: VLT 214		CREDIT UNIT: 3 HOURS/WEEK	
			CONTACT HOURS: 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 of veterinary laboratory equipment maintenance, glassware fabrication, LIMS, and digital surveillance systems.						
General Objective 1.0: Understand the principles and applications of laboratory equipment maintenance						
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 importance of laboratory equipment maintenance 1.2 Describe routine maintenance procedures for laboratory equipment 1.3 State causes of equipment failure	• Explain the importance of laboratory equipment maintenance • Describe routine maintenance procedures for laboratory equipment • Discuss causes of equipment failure	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Perform simple cleaning of laboratory equipment • Perform simple maintenance of laboratory equipment • Complete a simple maintenance checklist	Guide students to: • Perform simple cleaning of laboratory equipment • Perform simple maintenance of laboratory equipment • Complete a simple maintenance checklist	Microscope, centrifuge, incubator, cleaning materials Liquid detergents Disinfectants Maintenance logbook/checklist
General Objective 2.0: Understand the principles of vacuum production and applications in veterinary laboratories						
3-4	2.1 Explain the concept of vacuum production 2.2 State applications of vacuum systems in veterinary laboratories	• Explain the concept of vacuum production • Discuss the	Charts. Projector white board, Marker	• Observe operation of a simple vacuum system • Identify parts of a	Guide students to: • Observe operation of a simple vacuum system	PPE Manual vacuum pump Electric

	2.3 Explain safety precautions in handling vacuum systems 2.4 List common laboratory vacuum systems 2.5 Differentiate between manual and electric vacuum systems 2.6 State uses of different vacuum systems	applications of vacuum systems in veterinary laboratories • Discuss safety precautions in handling vacuum systems • Explain common lab vacuum systems • Discuss manual and electric vacuum systems • State uses of different vacuum systems	Text books, Internet. Lecture note, etc.	vacuum system • Demonstrate basic handling of vacuum systems	• Identify parts of a vacuum system • Demonstrate basic handling of vacuum systems	vacuum pump
General Objective 3.0: Understand different types of glasses used as laboratory ware						
5-6	3.1 Describe common laboratory glassware 3.2 Explain properties of laboratory glass 3.3 Differentiate between borosilicate and ordinary glass 3.4 Explain basic principles of glass fabrication 3.5 List tools used in glass fabrication 3.6 Mention safety precautions in glass fabrication and equipment handling 3.8 Describe maintenance procedures for equipment	• Describe common laboratory glassware • Explain properties of laboratory glass • Differentiate between borosilicate and ordinary glass • Explain basic principles of glass fabrication • List tools used in glass fabrication • 3.6 Mention safety precautions in glass fabrication and	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Identify sort laboratory glassware • Demonstrate proper handling of glassware • Perform simple glass cutting and bending • Fabricate simple glassware items • Clean store glass-blowing equipment properly • Inspect equipment	Guide students to: • Identify and sort laboratory glassware • Demonstrate proper handling of glassware • Perform simple glass cutting and bending • Fabricate simple glassware items • Clean and store glass-blowing equipment	Glass-blowing tools PPE Inspection checklist Charts, diagrams Glass cutter, burner Racks

		equipment handling • 3.8 Describe maintenance procedures for equipment		for faults • Demonstrate fabrication procedures • Demonstrate cleaning and storage methods	properly • Inspect equipment for faults • Demonstrate fabrication procedures • Demonstrate cleaning and storage methods	
General Objective 4.0: Understand Laboratory Information Management Systems (LIMS)						
7-9	4.1 Define Laboratory Information System (LIMS) 4.2 Management System (LIMS) 4.3 State applications of LIMS in veterinary laboratories 4.4 Mention benefits of digital laboratory records 4.5 Define real-time LIMS	• Explain Laboratory Information Management System • State applications of LIMS in veterinary laboratories • Explain benefits of digital laboratory records • Describe real-time LIMS	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Enter simple laboratory data into a digital system • Retrieve laboratory records from a digital system	Guide students to: • Enter simple laboratory data into a digital system • Retrieve laboratory records from a digital system	Computer system/software Sample laboratory database
General Objective 5.0: Apply digital surveillance systems in veterinary laboratory practice						
10-11	5.1 Explain digital surveillance in veterinary practice 5.2 Describe digital tools used for disease surveillance 5.3 Explain importance of digital	• Explain digital surveillance in veterinary practice • Describe digital tools used for disease		• Demonstrate use of simple digital reporting tools • Record surveillance data	Guide students to: • Demonstrate use of simple digital reporting tools • Record and	Smartphone / computer Internet-enabled

	reporting systems	surveillance • Explain the importance of digital reporting systems		• Transmit simple surveillance data	transmit simple surveillance data	devices LIMS Software
General Objective 6.0: Understand laboratory biosafety, waste management, and quality assurance						
12-13	6.1 Explain principles of laboratory biosafety 6.2 Describe types of laboratory waste 6.3 Explain principles of quality assurance in laboratories	• Describe principles of laboratory biosafety • Describe types of laboratory waste • Discuss principles of quality assurance in laboratories	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Demonstrate proper waste segregation and disposal • Apply basic laboratory safety procedures • Use simple quality control checklists	Guide students to: • Demonstrate proper waste segregation and disposal • Apply basic lab safety procedures • Use simple QC checklists	Waste bins, PPE Gloves, lab coat, disinfectants QC forms/check lists PPE
General Objective 7.0: Know professional ethics, documentation, and reporting skills in veterinary laboratories						
14-15	7.1 Explain professional ethics in veterinary laboratories 7.2 Explain proper laboratory documentation procedures 7.3 Explain importance of accurate laboratory reporting	• Discuss professional ethics in veterinary laboratories • Describe proper laboratory documentation procedures • Discuss importance of accurate laboratory reporting	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Complete simple laboratory records and reports • Practice proper documentation of laboratory activities • Demonstrate professional conduct during laboratory activities	Guide students to: • Complete simple laboratory records and reports • Practice proper documentation of laboratory activities • Demonstrate professional	Laboratory record books Sample forms and registers Laboratory environment

					conduct during laboratory activities	
COURSE ASSESSMENT Course Work: 10% Tests: 10% Practical: 40% Examination: 40% Total: 100%						



FEED AND NUTRITION DIAGNOSTICS

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: FEED AND NUTRITION DIAGNOSTICS	COURSE CODE: VLT 215	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in feed and nutrition diagnostics with emphasis on Nigerian feed ingredients and the FMARD/NIAS/NAFDAC feed-quality framework.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand principles of feed analysis and Nigerian feed regulation; 2.0 Understand feed sampling, sub-sampling and preparation for analysis; 3.0 Know proximate (Weende) analysis on feed samples; 4.0 Conduct Van Soest detergent fibre analysis (NDF, ADF, ADL); 5.0 Know minerals, vitamins and trace elements in feeds and tissues; 6.0 Know mycotoxins and anti-nutritional factors; 7.0 Know feed microbiology and rumen-fluid analysis; 8.0 Know blood biochemistry of nutritional disease; 9.0 Apply integrated knowledge to investigate clinical nutritional disorders.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: FEED AND NUTRITION DIAGNOSTICS			COURSE CODE: VLT 215		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in feed and nutrition diagnostics with emphasis on Nigerian feed ingredients and the FMARD/NIAS/NAFDAC feed-quality framework.						
GENERAL OBJECTIVE 1.0: Understand principles of feed analysis and Nigerian feed regulation.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define feed, nutrient, nutrition, ration, balanced diet. 1.2 List the six nutrient classes: water, carbohydrate, protein, fat, vitamin, mineral. 1.3 Describe the scope of feed analysis: nutritional, safety, regulatory. 1.4 Mention the Nigerian feed-	• Explain feed nutrients, nutrition ration and balance diet • Discuss all six nutrient classes. • Explain feed scope analysis. • Discuss Nigerian feed regulators. • List NRC standards. • Recognise feeds labelling requirements.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.			

	quality regulators: NAFDAC, SON, NIAS, FMARD, ARCN. 1.5 Discuss NRC standards. 1.6 Recognise feed labelling requirements: ingredients, guaranteed analysis, expiry, batch. 1.8 Describe Nigerian feed ingredients: maize, sorghum, millet, rice bran, wheat offal, palm-kernel cake, groundnut cake, soybean meal, fish meal, brewers' dried grains, cottonseed cake. 1.9 Discuss the role of the lab technologist in feed-quality assurance	• List Nigerian feed ingredients. • Explain lab technologist role in feed quality assurance				
GENERAL OBJECTIVE 2.0: Understand feed sampling, sub-sampling and preparation for analysis						
2	2.1 Describe appropriate lab feed	• Explain feed sampling by	Charts. Projector	Demonstrate probe sampling on a 25-kg bag	Guide students to: • Conduct feed	Probe, Feed samples,

sample size by quartering, by lot (typically 0.5–1 kg sample size) 2.2 Describe primary, secondary and laboratory sampling protocols. 2.3 Mention sampling tools: probe, trier, scoop, divider. 2.4 Explain sample preservation methods: dry, sealed, labelled with batch/date. 2.5 Describe sample preparation: grinding (2 mm or 1 mm mesh), homogenising, sub-sampling. 2.6 Explain feed sample custody chain for regulatory or forensic samples. 2.7 Explain mycotoxin and anti-nutrient sampling caveats.	quartering and lot size. • Describe sampling protocols. • Explain feed sampling tools. • List feed sample preservation methods. • Explain feed sample preparation. • Explain feed sample custody chain. • Explain mycotoxin and antinutrient feed sampling caveats.	white board, Marker Text books, Internet. Lecture note, etc.	of feed via quartering to 2kg and 250g. Demonstrate and grind a 250-g sample through a 1-mm mesh. Demonstrate maintaining chain-of-custody for 3 samples.	sampling. • Quartering sampling. • Grinding of samples. • Custody chain sample maintenance.	Feed bag, Quartering surface, Milling equipment, Custody template form, PPE.
GENERAL OBJECTIVE 3.0: Know proximate (Weende) analysis on feed samples					

5	3.1 Describe the 6 Weende fractions: moisture, ash, crude protein, crude fibre, ether extract, nitrogen-free extract (NFE). 3.2 Determine moisture by oven drying at 105 °C to constant weight. 3.3 Determine ash by ignition at 550–600 °C in muffle furnace. 3.4 Determine crude protein by Kjeldahl method: digestion, distillation, titration; $CP = N \times 6.25$. 3.5 Determine crude fibre by acid (1.25 % H_2SO_4) and alkali (1.25 % NaOH) digestion, ashing. 3.6 Determine ether extract by Soxhlet extraction with petroleum ether. 3.7 Calculate NFE by	• Explain Weende fractions. • Explain feed moisture drying • Explain ash content of feed. • Explain Crude protein (CP) of feeds. • Explain Crude fibre (CF) of feed. • Explain Ethe extract (EE) of feed. • Calculate Nitrogen free Extract (NFE) of feeds. • Compute energy via TDN and ME. • Keep all analytical records. • Explain Quality Control. • Explain proximate result standards.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Determine moisture on 5 feed samples. • Determine ash on 5 feed samples. • Perform Kjeldahl crude protein on 5 samples. • Determine crude fibre on a sample by Weende method. • Perform Soxhlet ether extraction on a sample. • Calculate NFE and TDN. • Perform filling of a feed-analysis logbook.	Guides students to: • Conduct moisture determination. • Conduct ash. determination • Conduct Kjeldahl. • Conduct CF determination. • Conduct Soxhlet ether extraction on a sample • Calculate TDN and NFE • Fill a feed analysis log book	Oven, Muffle furnace, Kjeldahl apparatus, Soxhlet apparatus, Feed samples, Crucibles, Kjeldahl kit, Weende reagents, Soxhlet kit, Calculator, Printer, PPE, Logbook.
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	difference: $100 - (\text{moisture} + \text{ash} + \text{CP} + \text{CF} + \text{EE})$. 3.8 Determine total digestible nutrients (TDN) and metabolizable energy (ME) estimates. 3.9 Maintain analytical records compliant with ISO 17025. 3.10 Recognise quality control: blanks, duplicates, certified reference materials. 3.11 Compare proximate results to NRC, AAFCO and Nigerian SON standards.					
GENERAL OBJECTIVE 4.0: Conduct Van Soest detergent fibre analysis (NDF, ADF, ADL)						
6	4.1 Distinguish Van Soest from Weende fibre analysis (more biologically meaningful for ruminants). 4.2 Determine Neutral Detergent Fibre	• Differentiate between Van Soest and Weende methods. • Explain NDF. • Explain ADF. • Explain ADL. • Determine hemicellulose	Charts. Projector white board, Marker Text books, Internet. Lecture	• Determine NDF on a forage sample. • Determine ADF on the same sample. • Calculate hemicellulose, cellulose and lignin. • Compare 3 Nigerian forages by Van Soest	Guide students to: • Demonstrate NDF. • Demonstrate ADF. • Guide calculation of Hemicellulose, cellulose and Lignin. • Guide comparison	Van Soest, Reagents, Reagents, Calculator, Forage samples, Van Soest Log, PPE.

(NDF) = hemicellulose + cellulose + lignin. 4.3 Determine Acid Detergent Fibre (ADF) = cellulose + lignin. 4.4 Determine Acid Detergent Lignin (ADL) = lignin. 4.5 Calculate hemicellulose = NDF – ADF; cellulose = ADF – ADL. 4.6 Recognise typical NDF, ADF values for Nigerian forages: maize stover (NDF 70 %; ADF 45 %); Pennisetum (NDF 65; ADF 40); cowpea haulm (NDF 55; ADF 38). 4.7 Apply Van Soest analysis to predict ruminant intake and digestibility. 4.8 Identify the ANKOM fibre analyser for routine analysis.	components. • Explain all values. • Predicting rumen intake and digestibility using Van Soest analysis. • Explain usage of ANKOM fibre analyses for routine analysis • Explain analytical record maintenance.	note, etc.	fractions. • Maintain Van Soest analysis log.	of forages by Van Soest fraction. • Demonstrate maintenance of Soest analysis log.	
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	4.9 Maintain analytical records.					
GENERAL OBJECTIVE 5.0: Know minerals, vitamins and trace elements in feeds and tissues						
7-8	5.1 List macro-minerals: Ca, P, Mg, Na, K, Cl, S. 5.2 List trace minerals: Fe, Cu, Zn, Mn, Se, I, Co, Mo. 5.3 Mention common Nigerian forage deficiencies: P, Cu, Zn, Se, Co. 5.4 Describe usage of atomic absorption spectrometry (AAS) for Ca, Mg, Fe, Cu, Zn. 5.5 Describe colorimetric methods: P (vanadomolybdate), Cu (bathocuproine), Zn (zincon). 5.6 Determine Ca by EDTA titration or AAS. 5.7 Determine P by vanadomolybdate spectrophotometry.	• Discuss microminerals. • Discuss trace minerals. • Explain common forage deficiencies. • Explain AAS. • Explain colorimetric. • Determine Calcium using EDTA titration or AAS. • Determine Phosphorus using spectrophotometry. • Explain emerging methods ICP-OES, ICP-MS. • List fat and water soluble vitamins. Determine Vitamin assay using HPLC. • Recognise deficiency syndromes. • Compare findings with NRC requirements.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Determine Ca by titration or AAS on a feed sample. • Determine P spectrophotometrically. • Apply AAS for Fe and Zn on 3 samples. • Identify mineral-deficiency syndromes from 5 case images. • Compare 3 Nigerian forages for mineral content.	Guide students to: • Identify macro and trace minerals. • Demonstrate mineral deficiencies. • Demonstrate AAS. • Demonstrate colorimetric. • Determine Ca. • Determine P. • Apply ICP. • Identify vitamins. • Apply HPLC. • Recognise syndromes. • Compare NRC. . Guide comparison. Guide identification.	Titration kit, Spectrophotometer, AAS samples, Forage data, Case images, PPE.

	5.8 Explain emerging methods: ICP-OES, ICP-MS. 5.9 Mention fat-soluble vitamins (A, D, E, K) and water-soluble (B-complex, C). 5.10 Apply HPLC for vitamin assay. 5.11 Recognise typical Nigerian deficiency syndromes: white-muscle disease (Se/Vit E), goitre (I), milk fever (Ca). 5.12 Compare findings to NRC requirements.					
GENERAL OBJECTIVE 6.0: Know mycotoxins and anti-nutritional factors						
9-10	6.1 Mention mycotoxin sources: Aspergillus (aflatoxin, ochratoxin), Fusarium (zearalenone, fumonisin, DON), Penicillium. 6.2 Recognise aflatoxin as a major Nigerian	• Outline mycotoxin sources. • Recognise mycotoxin problem in Maize and groundnuts. • Apply screening methods. • Apply M₁ in milk testing. • Recognise EU limits.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Apply LFA aflatoxin Screening on 5 maize and 5 groundnut samples. • Apply ELISA for aflatoxin M₁ on a milk sample. • Apply HCN colorimetric test on cassava. • Apply tannin assay on a sorghum sample.	Guide students to: • Apply LFA aflatoxin Screening on 5 maize and 5 groundnut samples. • Apply ELISA for aflatoxin M₁ on a milk sample. • Apply HCN colorimetric test on	LFA kits, Samples, ELISA kit, TLC plates, HCN reagents, Tannin reagents, Report template sheet, PPE.

	contamination problem (maize, groundnut). 6.3 Describe screening methods: lateral-flow assay (LFA), ELISA, TLC, HPLC. 6.4 Apply Aflatoxin M₁ in milk testing by ELISA. 6.5 Recognise EU limits (4 PPM total aflatoxin in feed) and Nigerian limits. 6.6 Identify Nigerian mycotoxin hotspots: groundnut, maize, palm-kernel cake. 6.7 Apply mycotoxin-binder evaluation. 6.8 Describe anti-nutritional factors: trypsin inhibitors (soybean), tannins (sorghum), gossypol (cotton-seed), HCN (cassava), oxalates, phytates. 6.9 Describe colorimetric tannin assay (Folin-	• Identify mycotoxins hotspots. • Explain mycotoxin binders' evaluation. • Identify ANFs crops. • Explain colorimeter tannin assay. • Apply HCN screening on cassava. • Explain how to maintain mycotoxin records		• Compose a mycotoxin-surveillance report.	cassava. • Apply tannin assay on a sorghum sample. • Compose a mycotoxin-surveillance report.	
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	Ciocalteu or vanillin-HCl). 6.10 Describe HCN screening on cassava products. 6.12 Maintain mycotoxin-screening records.					
GENERAL OBJECTIVE 7.0: Know feed microbiology and rumen-fluid analysis						
11-12	7.1 List common feed micro-organisms: Salmonella, E. coli, Clostridium, fungi, yeasts. 7.2 Describe total viable count (TVC) on feed by plate count. 7.3 Conduct Salmonella isolation from feed (selective enrichment + culture). 7.4 Conduct <i>E. coli</i> detection. 7.5 Examine mould count and fungal isolation. 7.6 Describe rumen anatomy and microflora.	• Mention microbes in feed. • Apply TVC on feed samples. • Apply Salmonella isolation on feed samples. • Examine E. coli. Count • Examine fungi count. • Explain rumen anatomy. • Collect rumen fluid. • Measure rumen fluid parameters. • Explain microscopic exams • Determine VFA. • Apply MBRT. • Diagnose rumen PH	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Apply TVC on a feed sample. • Apply Salmonella isolation on feed. • Collect rumen fluid (or use cadaver sample). • Measure rumen pH and conduct microscopy. • Apply MBRT. • Compose a rumen-fluid diagnostic report.	Guide students to: • Apply TVC on a feed sample. • Apply Salmonella isolation on feed. • Collect rumen fluid (or use cadaver sample). • Measure rumen pH and conduct microscopy. • Apply MBRT. • Compose a rumen-fluid diagnostic report.	Plates, Dilutions, Bunsen burner, Auto feed analyser, Selective media, Stomach tube, Rumen fistula on life animals, Cadaver, pH meter, microscope, Methylene blue, Report template, Printer, PPE.

	7.7 Describe rumen fluid collection by stomach tube or rumenocentesis. 7.8 Describe how to measure rumen-fluid parameters: pH (6.0–6.8 normal), colour, smell, consistency. 7.9 Describe microscopic: 60% examination protozoa bacteria. 7.10 Describe volatile fatty acids (VFA) by gas chromatography (demo). 7.11 Apply methylene-blue reduction time (MBRT) as activity indicator. 7.12 Diagnose rumen acidosis, alkalosis, indigestion.	and indigestion.				
GENERAL OBJECTIVE 8.0: Know blood biochemistry of nutritional disease						
13	8.1 Mention blood-biochemistry tests for nutritional status: total protein, albumin, globulin,	• Describe blood biochemistry tests. • Identify minerals. • Use NEFA/BHBA for transition cows	Charts. Projector white board, Marker	• Demonstrate serum biochemistry on 5 samples. • Interpret 3 nutritional-disease cases.	Guide students to: • Demonstrate serum biochemistry on 5 samples. • Interpret 3	Biochemistry analyser, Test tubes, Test kits, Case files,

	urea, creatinine, glucose, NEFA, BHBA. 8.2 Describe mineral panels: Ca, P, Mg, Na, K. 8.3 Describe NEFA and BHBA for transition-cow ketosis diagnosis. 8.4 Describe blood urea for protein-status assessment. 8.5 Define hypocalcaemia (milk fever): serum Ca < 1.5 mmol/L. 8.6 Describe hypomagnesaemia (grass tetany): serum Mg < 0.5 mmol/L. 8.7 Discuss trace-mineral status from serum: Cu, Zn, Se (GSH-Px). 8.8 Discuss vitamin status: serum 25(OH)D for vitamin D; α-tocopherol for vitamin E.	ketosis diagnosis. • Use blood urea for protein synthesis. • Explain hypocalcaemia. • Interpret hypomagnesium. • Examine trace minerals status. • Explain vitamin status. • Recognise normal ranges. • Compose blood biochemistry report.	Text books, Internet. Lecture note, etc.	• Demonstrate the application of NEFA/BHBA in a transition-cow scenario. • Compose a full blood biochemistry report.	nutritional-disease cases. • Demonstrate the application of NEFA/BHBA in a transition-cow scenario. • Compose a full blood biochemistry report.	Scenarios, Reporting template, Sheet, Printer, PPE.
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	8.9 Recognise normal ranges for cattle, sheep, goats, pigs, poultry. 8.10 Describe a blood-biochemistry report.					
GENERAL OBJECTIVE 9.0: Apply integrated knowledge to investigate clinical nutritional disorders.						
14-15	9.1 Define ketosis (acetonemia): NEFA, BHBA, glucose, milk testing. 9.2 Define milk fever: serum Ca, P, Mg; clinical response to Ca therapy. 9.3 Define grass tetany: serum Mg, urine Mg, soil/forage Mg. 9.4 Define white-muscle disease: GSH-Px, creatine kinase, AST. 9.5 Define polio encephalomalacia (thiamine deficiency): brain histology, thiamine response.	• Explain ketosis. • Explain milk fever. • Explain grass tetany. • Explain White muscle diseases -WMD. • Explain PEM. • Explain goitre. • Define Cu deficiency. • Define aflatoxicosis. • Describe case studies.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Identify three (3) integrated nutritional-disease cases.	• Guide students on tour to Livestock farm, Abattoir and Livestock market to Identify three (3) integrated nutritional-disease cases.	Case files, Animals portfolio rubric, Clinical cases on animals in livestock farm, Video recording of live clinical cases.

	9.6 Define iodine-deficiency goitre. 9.7 Describe copper deficiency: serum Cu, ceruloplasmin. 9.8 Define aflatoxicosis: clinical, liver biochemistry, feed mycotoxin assay. 9.9 Explain integrated case studies.					
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						

ZOONOTIC DISEASE SURVEILLANCE

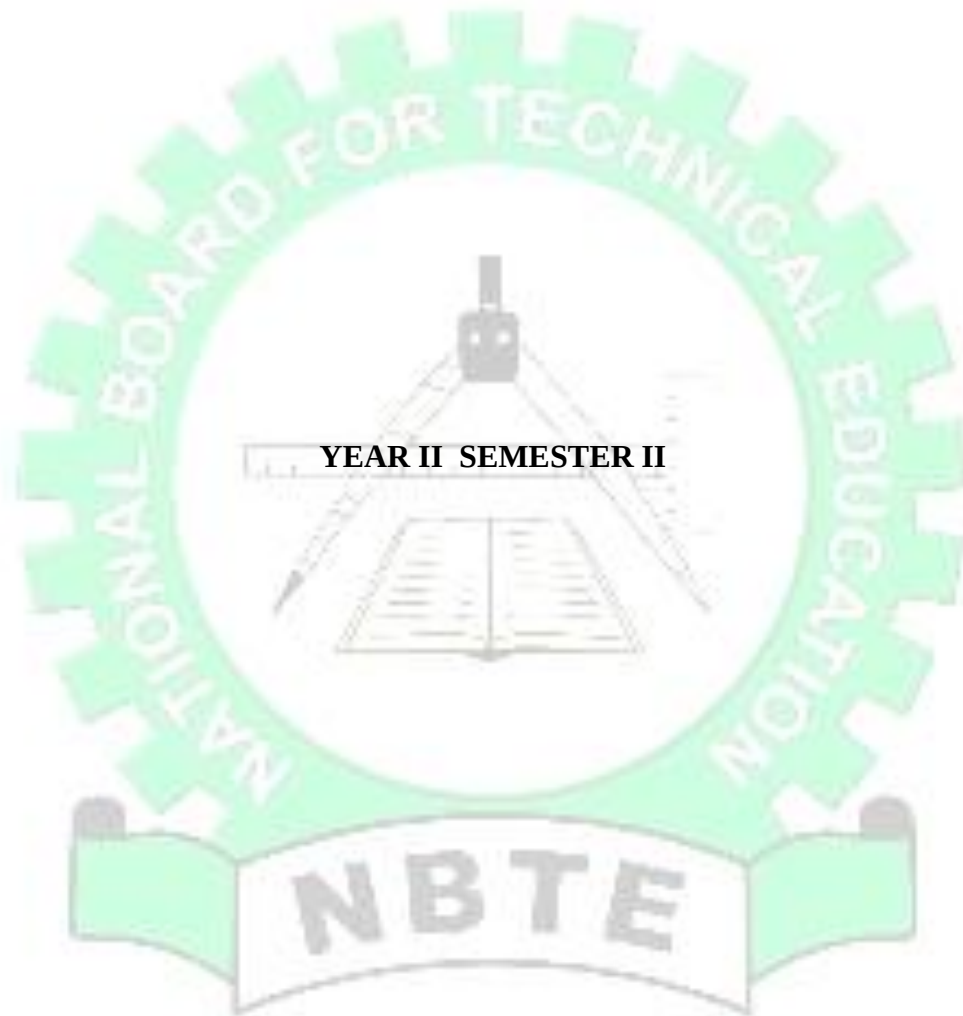
PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: ZOONOTIC DISEASE SURVEILLANCE	COURSE CODE: VLT 216	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with knowledge and skills required to recognize, monitor, report and support the control of zoonotic diseases of public health importance through effective veterinary laboratory surveillance and the One Health approach.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the One Health framework and the principles of zoonotic diseases; 2.0 Know major zoonotic diseases of public health importance in Nigeria and West Africa; 3.0 Understand principles and methods of zoonotic disease surveillance; 4.0 Know how to collect, handle and transport specimens safely from suspected zoonotic cases; 5.0 Understand laboratory diagnostic techniques used in the detection of zoonotic diseases; 6.0 Understand disease reporting pathway; 7.0 Understand biosafety, biosecurity and personal protective measures in zoonotic disease surveillance; 8.0 Understand community engagement, public awareness and risk communication in zoonotic disease prevention and surveillance.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ZONOTIC DISEASE SURVEILLANCE			COURSE CODE: VLT 216		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 2		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: I			PRE-REQUISITE:		PRACTICAL: 1 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills required to recognize, monitor, report and support the control of zoonotic diseases of public health importance through effective veterinary laboratory surveillance and the One Health approach.						
General Objective 1.0: Understand the One Health framework and the principles of zoonotic diseases						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Define One Health and Zoonosis. 1.2 Explain the relationship between humans, animals and the environment in disease transmission. 1.3 Mention categories of zoonotic diseases.	• Discuss One Health and Zoonosis. • Describe the relationship between humans, animals and the environment in disease transmission. • Explain categories of zoonotic diseases	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.			
General Objective 2.0: Know major zoonotic diseases of public health importance in Nigeria and West Africa						
3-4	2.1 List common zoonotic diseases in the region. 2.2 Mention causative agents, reservoirs and vectors. 2.3 Describe signs and	• Describe common zoonotic diseases in the region. • Explain causative agents, reservoirs and vectors. • Explain signs and	Charts. Projector white board, Marker Text books, Internet.	• Observation of photographs/slides/s pecimens of zoonotic diseases and vectors. • Abattoir visit	Guide students to: • Observe photographs/slides/specimen s of zoonotic diseases and vectors. • Abattoir visit	Photograph s, Slides, Specimens, PPE, Magnifying lenses.

	symptoms in animals and humans.	symptoms in animals and humans	Lecture note, etc.			
General Objective 3.0: Understand principles and methods of zoonotic disease surveillance						
5-6	3.1 Define disease surveillance. 3.2 Differentiate active, passive, sentinel and syndromic surveillance. 3.3 Outline steps in surveillance data collection and monitoring	• Explain disease surveillance. • Discuss active, passive, sentinel and syndromic surveillance. • Describe steps in surveillance data collection and monitoring	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.			
General Objective 4.0: Know how to collect, handle and transport specimens safely from suspected zoonotic cases						
7	4.1 Explain the types of samples collected for zoonotic investigations. 4.2 Describe procedures for specimen collection and preservation. 4.3 Describe packaging and transportation procedures.	• Describe the types of samples collected for zoonotic investigations. • Explain procedures for specimen collection and preservation. • 4.3 Explain packaging and transportation procedures.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Carryout sample collection, labeling, packaging and transportation	• Guide the students to demonstration sample collection, labeling, packaging and transportation	Sample containers, Swabs, PPE, Cold boxes, Labels.
General Objective 5.0: Understand laboratory diagnostic techniques used in the detection of zoonotic diseases						
8-9	5.1 Mention common laboratory diagnostic methods for	• Describe common laboratory diagnostic methods for zoonoses.	Charts. Projector	• Demonstration rapid diagnostic tests, microscopy and	Guide students to: • Demonstration of rapid diagnostic tests, microscopy	Microscope s, Rapid test kits,

	zoonoses. 5.2 Explain principles of microbiological, serological and molecular techniques. 5.3 Interpret basic laboratory findings.	• Discuss principles of microbiological, serological and molecular techniques. • Explain basic laboratory findings.	white board, Marker Text books, Internet. Lecture note, etc.	simple laboratory procedures.	and simple laboratory procedures	ELISA kits, Sample microscopic images of pathogens, Laboratory manuals.
General Objective 6.0: Understand disease reporting pathways						
10-11	6.1 Explain national and international disease reporting systems. 6.2 Explain roles of NCDC, NVRI, FDVPCS, WOA and IHR. 6.3 Describe procedures for notification of zoonotic diseases.	• Discuss national and international disease reporting systems. • Discuss roles of NCDC, NVRI, FDVPCS, WOA and IHR. • Explain procedures for notification of zoonotic diseases.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Simulate the notification and reporting of diseases • Conduct active surveillance of an identified zoonotic disease	Guide students to: • Simulation of notification and reporting of diseases • Conduct active surveillance of an identified zoonotic disease	Reporting forms, Internet facilities, Computers.
General Objective 7.0: Understand biosafety, biosecurity and personal protective measures in zoonotic disease surveillance						
12-13	7.1 Define biosafety and biosecurity. 7.2 Mention laboratory hazards associated with zoonotic agents. 7.3 Describe proper use of Personal Protective Equipment (PPE)	• Explain biosafety and biosecurity. • Describe laboratory hazards associated with zoonotic agents. • Explain proper use of Personal Protective Equipment (PPE)	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Demonstrate proper donning and doffing of PPE • Demonstrate proper disposal of PPE	Guide students to: • Demonstrate proper donning and doffing of PPE • Demonstrate proper disposal of PPE	PPE.

General Objective 8.0: Understand community engagement, public awareness and risk communication in zoonotic disease prevention and surveillance						
14-15	8.1 Explain the importance of community participation in surveillance. 8.2 Explain methods of risk communication. 8.3 Outline strategies for public awareness campaigns.	• Discuss the importance of community participation in surveillance. • Describe methods of risk communication. • Describe strategies for public awareness campaigns.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Carryout preparation and presentation of simple zoonotic disease awareness messages/posters	Guide students to: • Prepare and present simple zoonotic disease awareness messages/posters	Posters, Flyers, Audiovisual materials, Public health campaign samples, Computer, Projector, White board, Internet.
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						



RECORD KEEPING AND DATA MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: RECORD KEEPING AND DATA MANAGEMENT	COURSE CODE: VLT 221	CREDIT UNIT: 3 HOURS/WEEK
	CONTACT HOURS: 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 required for proper veterinary laboratory record keeping, data handling, reporting, and the use of Laboratory Information Management Systems (LIMS).		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understanding the principles and importance of record keeping in veterinary laboratories; 2.0 Know different types of laboratory records, registers, and documentation systems; 3.0 Understand methods of collecting, storing, retrieving, and securing laboratory data; 4.0 Apply basic computer skills and digital tools in veterinary laboratory data management; 5.0 Know how to operate and utilize basic features of Laboratory Information Management Systems (LIMS); 6.0 Understand confidentiality, accuracy, and integrity of laboratory records and reports; 7.0 Understand laboratory reports, inventories, and statistical summaries; 8.0 Apply quality assurance and regulatory requirements in laboratory documentation and data management.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: RECORD KEEPING AND DATA MANAGEMENT			COURSE CODE: VLT 221		CREDIT UNIT: 3 HOURS/WEEK	
			CONTACT HOURS: 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 required for proper veterinary laboratory record keeping, data handling, reporting, and the use of Laboratory Information Management Systems (LIMS).						
General Objective 1.0: Understanding the principles and importance of record keeping in veterinary laboratories.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Define record keeping. 1.2 State the importance of accurate laboratory records in veterinary laboratories. 1.3 Explain principles of good documentation practices.	- Discuss record keeping. - Explain the importance of accurate laboratory records in veterinary laboratories. - Discuss principles of good documentation practices.	Whiteboard /marker lecture notes, sample laboratory records Projector Internet Chart			
General Objective 2.0: Know different types of laboratory records, registers, and documentation systems.						
2-3	2.1 List the types of laboratory records. 2.2 Differentiate between manual and electronic records.	- Discuss the types of laboratory records. - Explain manual and electronic record types. - Explain documentation	Charts, Lecture notes, sample documents, Projector	- Visit vet laboratories - Write technical reports after visitation	Guide students to : - Visit vet laboratories - Write technical reports after	Logistics Technical report book Standard

	2.3 Explain documentation flow in laboratories.	flow in laboratories.	Internet White board Marker		visitation	reporting template
General Objective 3.0: Understand methods of collecting, storing, retrieving, and securing laboratory data						
4-5	3.1 Outline methods of data collection. 3.2 State principles of data storage and retrieval. 3.3 Explain data security measures.	• Discuss methods of data collection. • Describe principles of data storage and retrieval. • Describe data security measures	Charts, lecture notes, sample documents, Projector Internet White board Marker Posters Cyberhygiene	• Process simple laboratory data. • Demonstrate safe storage of records. • Carryout Installing updating of anti viruses	Guide students to: • Enter and retrieve simple laboratory data. • Demonstrate safe storage of records. • Installing and updating anti viruses	Computer system, Flash/external hard drive, Cloud storage Servers Sample datasets Antiviruses Files Safe lock cabinets
General Objective 4.0: Apply basic computer skills and digital tools in veterinary laboratory data management						
6-7	4.1 Describe digital tools used in laboratories. 4.2 Explain uses of spreadsheets and databases. 4.3 Explain advantages of computerized records.	• Describe digital tools used in laboratories. • Explain uses of spreadsheets and databases. • Explain advantages of computerized records over manual records.	Charts, lecture notes, sample documents, Projector Internet White board Marker Manuals	• Create simple laboratory data tables. • Use spreadsheets for basic record keeping.	Guide students to: • Create simple laboratory data tables. • Use spreadsheets for basic record keeping • Tour Server rooms	Computer system, Flash/external hard drive, Cloud storage, Servers, Sample datasets, Antiviruses, Logistics .
General Objective 5.0: Know how to operate and utilize basic features of Laboratory Information Management Systems (LIMS).						

8-9	5.1 Define LIMS. 5.2 Explain functions and benefits of LIMS. 5.3 Explain the components of LIMS software (such as Sample Management, Data Management, Test and Workflow Management, Result Management and Reporting, etc.) 5.4 Explain Real time LIMS	• Explain LIMS. • Discuss functions and benefits of LIMS. • Explain the components of LIMS • Discuss Real time LIMS	LIMS screenshots, lecture notes, Projector Internet White board Marker Video display of LIMS Trouble shoot charts for LIMS.	• Log into a sample LIMS platform. • Enter and retrieve sample laboratory data using LIMS. • Demonstrate LIMS entries	Guide students to: • Log into a sample LIMS platform. • Enter and retrieve sample laboratory data using LIMS. • Demonstrate LIMS entries	Computer system, Real time Demo LIMS LIMS Software Internet Hardware storage Internet cloud
General Objective 6.0: Understand confidentiality, accuracy, and integrity of laboratory records and reports.						
10-11	6.1 Explain confidentiality in laboratory practice. 6.2 State causes of record errors. 6.3 Explain ethical issues in data handling.	• Discuss confidentiality in laboratory practice. • Discuss causes of record errors. • Explain ethical issues in data handling	Lecture notes, case studies Projector Internet White board Marker			
General Objective 7.0: Understand laboratory reports, inventories, and statistical summaries						
12-13	1.1 List components of laboratory reports. 1.2 Describe inventory records. 1.3 Explain basic statistical summaries.	• Explain components of laboratory reports. • Describe inventory records. • Discuss basic statistical summaries.	Sample reports, inventory forms White board Marker Internet Projector Charts/posters	• Write laboratory report summaries. • Calculate basis statical summaries	Guide students to: • Write laboratory report summaries. • Calculate basis statical summaries	Computer, Printer, Files Internets Scanners

General Objective 8.0: Apply quality assurance and regulatory requirements in laboratory documentation and data management.

14-15	8.1 Explain quality assurance in documentation. 8.2 Explain basic regulatory requirements. 8.3 State consequences of non-compliance.	• Discuss quality assurance in documentation. • Explain basic regulatory requirements. • Describe the consequences of non-compliance	SOP samples, lecture notes White board Marker Internet Projector Manuals Regulatory hand books			
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COURSE ASSESSMENT

Course Work: 10%

Tests: 10%

Practical: 40%

Examination: 40%

Total: 100%

BASIC VETERINARY TOXICOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: BASIC VETERINARY TOXICOLOGY	COURSE CODE: VLT 222	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is design to equip the student with knowledge and skills of veterinary toxicology		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Comprehend the principles, history and terminology of veterinary toxicology. 2.0 Know plant toxicants of Nigerian livestock. 3.0 Know mycotoxins relevant to Nigerian feed safety. 4.0 Know pesticide, herbicide and industrial-chemical toxicants. 5.0 Understand heavy-metal toxicities and laboratory analysis. 6.0 Know rodenticides, venoms and miscellaneous toxicants. 7.0 Apply correct sample collection for suspected poisoning cases. 8.0 Know analytical laboratory techniques in toxicology. 9.0 Comprehend forensic, regulatory and One Health frameworks.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: BASIC VETERINARY TOXICOLOGY		COURSE CODE: VLT 222		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 design to equip the student with knowledge and skills of veterinary toxicology						
GENERAL OBJECTIVE 1.0: Comprehend the principles, history and terminology of veterinary toxicology.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1-2	1.1 Define toxicology, toxicant, toxin, poison, xenobiotic. 1.2 Define acute, sub-acute, chronic toxicity. 1.3 Describe the dose-response relationship: NOAEL, LOAEL, LD ₅₀ , LC ₅₀ , TI. 1.4 Describe routes of exposure: oral, dermal, inhalation, parenteral. 1.5 Explain absorption, distribution, metabolism, excretion (ADME). 1.6 Describe	• Explain toxicology, toxicant, toxin, poison, xenobiotic. • Explain acute, sub-acute, chronic toxicity. • Discuss the dose-response relationship: NOAEL, LOAEL, LD₅₀, LC₅₀, TI. • Explain routes of exposure: oral, dermal, inhalation, parenteral. • Explain absorption, distribution, metabolism, excretion (ADME). • Describe biotransformation:	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.			

	biotransformation: Phase I (oxidation/reduction/hydrolysis) and Phase II (conjugation). 1.7 Explain mechanisms of toxicity: enzyme inhibition, receptor binding, free radical, DNA damage. 1.8 Mention factors affecting toxicity: species, age, sex, nutrition, environment. 1.9 Describe the roles of NAFDAC, NESREA and VCN in toxico-vigilance. 1.10 Discuss the lab technologist's role in toxicology workflow.	Phase I (oxidation/reduction/hydrolysis) and Phase II (conjugation). • Discuss mechanisms of toxicity: enzyme inhibition, receptor binding, free radical, DNA damage. • Mention factors affecting toxicity: species, age, sex, nutrition, environment. • Discuss the roles of NAFDAC, NESREA and VCN in toxico-vigilance. • Discuss the lab technologist's role in toxicology workflow.				
GENERAL OBJECTIVE 2.0: Know plant toxicants of Nigerian livestock.						
3-4	2.1 Describe cyanogenic glycoside-containing plants: cassava (<i>Manihot esculenta</i>), sorghum young shoots, bamboo shoots, bitter almond. 2.2 Describe <i>Cassia</i> spp. (<i>Cassia occidentalis</i>, <i>Cassia obtusifolia</i>): myodegeneration, hepatic injury.	• Discuss cyanogenic glycoside-containing plants: cassava (<i>Manihot esculenta</i>), sorghum young shoots, bamboo shoots, bitter almond. • Explain <i>Cassia</i> spp. (<i>Cassia occidentalis</i>, <i>Cassia obtusifolia</i>): myodegeneration, hepatic injury.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Identify 10 Nigerian toxic plant species. • Apply cyanide screening on cassava sample. • Compose a plant-	Guide students to: • Identify 10 Nigerian toxic plant species. • Apply cyanide screening on cassava sample.	Plant samples. Cyanide kit. Case template. Photo atlas. PPE

2.3 Describe <i>Crotalaria</i> spp.: pyrrolizidine alkaloids; hepatic veno-occlusive disease. 2.4 Describe <i>Lantana camara</i>: hepatotoxic, photosensitisation. 2.5 Describe <i>Datura stramonium</i> (Jimson weed): tropane alkaloids; anticholinergic. 2.6 Describe <i>Ricinus communis</i> (castor): ricin; severe gastroenteritis. 2.7 Explain <i>Tithonia diversifolia</i>: low toxicity but safe browse limit. 2.8 Describe <i>Senecio</i> (ragwort), Indigofera, Calotropis, Solanum, Nerium oleander. 2.9 Describe photosensitisation plants: <i>Lantana</i>, <i>Cymopterus</i>, <i>Tetradymia</i>. 2.10 Explain oxalate plants (Halogeton, Sorrel, beetroot greens). 2.11 Explain clinical and lab approach to plant poisoning	• Describe <i>Crotalaria</i> spp.: pyrrolizidine alkaloids; hepatic veno-occlusive disease. • Describe <i>Lantana camara</i>: hepatotoxic, photosensitisation. • Discuss <i>Datura stramonium</i> (Jimson weed): tropane alkaloids; anticholinergic. • Describe <i>Ricinus communis</i> (castor): ricin; severe gastroenteritis. • Describe <i>Tithonia diversifolia</i>: low toxicity but safe browse limit. • Explain <i>Senecio</i> (ragwort), Indigofera, Calotropis, Solanum, Nerium oleander. • Describe photosensitisation plants: <i>Lantana</i>, <i>Cymopterus</i>, <i>Tetradymia</i>. • Discuss oxalate plants (Halogeton, Sorrel, beetroot greens). • Discuss clinical and lab approach to plant poisoning	poisoning case investigation. • Examine clinical photos of plant-poisoning lesions.	• Compose a plant-poisoning case investigation. • Examine clinical photos of plant-poisoning lesions.
GENERAL OBJECTIVE 3.0: Know mycotoxins relevant to Nigerian feed safety.			

5-6	3.1 Define aflatoxins. 3.2 Explain aflatoxin M₁ in milk (metabolite B₁). 3.3 Describe aflatoxicosis. 3.4 Define ochratoxin. 3.5 Explain fumonisin. 3.6 Describe zearalenone. 3.7 Explain deoxynivalenol (DON/vomitoxin): feed refusal, vomiting. 3.8 Define ergot alkaloids. 3.9 Mention screening: - LFA (lateral flow), ELISA, - TLC, HPLC. - Aflatoxin M₁ milk-screening by ELISA. 3.11 Explain mycotoxin-binders (clay, activated charcoal, yeast cell wall).	• Explain aflatoxins. • Explain aflatoxin M₁ in milk (metabolite B₁). • Explain aflatoxicosis. • Discuss ochratoxin. • Describe fumonisin. • Define zearalenone. • Explain deoxynivalenol (DON/vomitoxin): feed refusal, vomiting. • Define ergot alkaloids. • Mention screening: — LFA (lateral flow), ELISA, — TLC, HPLC. — Aflatoxin M₁ milk-screening by ELISA. • Explain mycotoxin-binders (clay, activated charcoal, yeast cell wall).	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Apply LFA aflatoxin screening on 5 maize/groundnut samples. • Apply ELISA for aflatoxin M₁ in milk. • Apply TLC for crude aflatoxin detection. • Compose a mycotoxin surveillance report. • Visit (or virtually tour) a feed lab.	Guide the student to: • Apply LFA aflatoxin screening on 5 maize/groundnut samples. • Apply ELISA for aflatoxin M₁ in milk. • Apply TLC for crude aflatoxin detection. • Compose a mycotoxin surveillance report. • Visit (or virtually tour) a feed lab.	LFA kits. ELISA kit. TLC plates. Report template. Lab access. Charts Internet Sample screening test result Atlas of signs of toxicity PPE
GENERAL OBJECTIVE 4.0: Know pesticide, herbicide and industrial chemical toxicants.						
7-8	4.1 Define organophosphates (OP): chlorpyrifos, malathion, diazinon; cholinesterase inhibition. 4.2 Define carbamates: carbofuran, propoxur; reversible cholinesterase inhibition. 4.3 Define organochlorines:	• Discuss organophosphates (OP): chlorpyrifos, malathion, diazinon; cholinesterase inhibition. • Discuss carbamates: carbofuran, propoxur; reversible cholinesterase inhibition.	Charts. Projector white board, Marker Text books, Internet.	• Apply cholinesterase activity test on blood samples. • Identify 5 pesticide labels and	Guide students to: • Apply cholinesterase activity test on blood samples. • Identify 5	Test kit. Labels. Reagents. Case template. Atlas of signs of toxicity Sample test results PPE

DDT (banned), lindane (restricted), aldrin, dieldrin. 4.4 Define synthetic pyrethroids: cypermethrin, deltamethrin, permethrin. 4.5 Describe pesticide clinical signs: SLUDDE (Salivation, Lacrimation, Urination, Defecation, Dyspnoea, Emesis) for OP/carbamate. 4.6 Discuss atropine, oxime (2-PAM) treatment principles. 4.7 Discuss herbicides: glyphosate (Roundup), paraquat (banned in EU), 2,4-D. 4.8 Describe paraquat: pulmonary fibrosis; high mortality. 4.9 Mention industrial chemicals: petroleum products, solvents, polychlorinated biphenyls (PCB). 4.10 Describe cholinesterase activity test for OP/carbamate diagnosis. 4.11 Discuss pesticide-exposure records.	• Discuss organochlorines: DDT (banned), lindane (restricted), aldrin, dieldrin. • Define synthetic pyrethroids: cypermethrin, deltamethrin, permethrin. • Explain pesticide clinical signs: SLUDDE (Salivation, Lacrimation, Urination, Defecation, Dyspnoea, Emesis) for OP/carbamate. • Explain atropine, oxime (2-PAM) treatment principles. • Explain herbicides: glyphosate (Roundup), paraquat (banned in EU), 2,4-D. • Define paraquat: pulmonary fibrosis; high mortality. • Explain industrial chemicals: petroleum products, solvents, polychlorinated biphenyls (PCB). • Explain cholinesterase activity test for OP/carbamate diagnosis. • Explain pesticide-exposure records.	Lecture note, etc.	active ingredients. • Apply qualitative screening for OP residue. • Compose a pesticide-poisoning case investigation.	pesticide labels and active ingredients. • Apply qualitative screening for OP residue. • Compose a pesticide-poisoning case investigation.	
GENERAL OBJECTIVE 5.0: Understand heavy-metal toxicities and laboratory analyses.					

9-10	5.1 Describe lead (Pb) toxicity: sources (paint, batteries, contaminated water/soil); clinical signs (CNS, GI); diagnosis (blood Pb > 0.35 ppm). 5.2 Describe mercury (Hg) toxicity: organic (methylmercury — fish), inorganic; signs (CNS). 5.3 Describe cadmium (Cd) toxicity: renal, bone; from contaminated forage. 5.4 Describe arsenic (As) toxicity: organic vs inorganic; sources (wood preservatives, water). 5.5 Describe selenium (Se) excess: alkali disease, blind staggers; deficiency: white muscle. 5.6 Describe copper (Cu) excess in sheep: chronic Cu toxicity; jaundice. 5.7 Describe zinc, iron, fluoride excess. 5.8 Describe atomic absorption spectrometry (AAS) for heavy-metal analysis. 5.9 Describe ICP-OES/ICP-MS for advanced analysis.	• Explain lead (Pb) toxicity: sources (paint, batteries, contaminated water/soil); clinical signs (CNS, GI); diagnosis (blood Pb > 0.35 ppm). • Explain mercury (Hg) toxicity: organic (methylmercury — fish), inorganic; signs (CNS). • Explain cadmium (Cd) toxicity: renal, bone; from contaminated forage. • Explain arsenic (As) toxicity: organic vs inorganic; sources (wood preservatives, water). • Explain selenium (Se) excess: alkali disease, blind staggers; deficiency: white muscle. • Explain copper (Cu) excess in sheep: chronic Cu toxicity; jaundice. • Explain zinc, iron, fluoride excess. • Explain atomic absorption spectrometry (AAS) for heavy-metal analysis. • Explain ICP-OES/ICP-MS for advanced analysis. • Discuss sample types: blood, liver, kidney, hair, faeces.	Reference textbooks. Projector. Charts Internet White board marker	• Apply AAS for Pb on a blood or liver sample. • Apply AAS for Cu on a sheep liver sample. • Compose a heavy-metal diagnostic report. • Examine 3 case studies of Nigerian heavy-metal poisoning.	Guide students to: • Apply AAS for Pb on a blood or liver sample. • Apply AAS for Cu on a sheep liver sample. • Compose a heavy-metal diagnostic report. • Examine 3 case studies of Nigerian heavy-metal poisoning.	Atomic Absorption Spectroscopy (AAS). Samples. Charts Report template. Case studies. PPE
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	5.10 List sample types: blood, liver, kidney, hair, faeces. 5.11 Discuss SON, NAFDAC, FAO/WHO Codex limits. 5.12 Discuss heavy-metal diagnostic report.	• Explain SON, NAFDAC, FAO/WHO Codex limits. • Explain heavy-metal diagnostic report.				
GENERAL OBJECTIVE 6.0: Know rodenticides, venoms and miscellaneous toxicants.						
11	6.1 Define anticoagulant rodenticides (warfarin, brodifacoum, bromadiolone): coagulopathy. 6.2 Define non-anticoagulant: zinc phosphide, strychnine, bromethalin. 6.3 Determine PT/PTT for rodenticide diagnosis. 6.4 Mention Nigerian venomous snakes: carpet viper (<i>Echis ocellatus</i>), puff adder (<i>Bitis arietans</i>), spitting cobra (<i>Naja nigricollis</i>), Egyptian cobra (<i>Naja haje</i>). 6.5 Describe snake-venom effects: cytotoxic (vipers), neurotoxic (cobras), haemotoxic. 6.6 Discuss antivenom: polyvalent EchiTAb	• Discuss anticoagulant rodenticides (warfarin, brodifacoum, bromadiolone): coagulopathy. • Discuss non-anticoagulant: zinc phosphide, strychnine, bromethalin. • Explain Prothrombin Time/Partial Thromboplastin Time (PT/PTT) for rodenticide diagnosis. • Identify Nigerian venomous snakes: carpet viper (<i>Echis ocellatus</i>), puff adder (<i>Bitis arietans</i>), spitting cobra (<i>Naja nigricollis</i>), Egyptian cobra (<i>Naja haje</i>). • Explain snake-venom effects: cytotoxic (vipers), neurotoxic (cobras), haemotoxic. • Explain antivenom: polyvalent EchiTAb (NIPRD-developed).	Rodenticide labels. Photos of snakes and Scorpion Reference textbooks. Projector. Internet White board marker	• Apply PT/PTT for suspected anticoagulant rodenticide. • Identify Nigerian venomous snakes from photos. • Profile EchiTAb antivenom production. • Compose a poisoning-therapy SOP.	Guide the students to: • Apply PT/PTT for suspected anticoagulant rodenticide. • Identify Nigerian venomous snakes from photos. • Profile EchiTAb antivenom production. • Compose a poisoning-therapy SOP.	PT/PTT kit. Preserved Specimens of snakes and scorpions. NIPRD data. SOP template. Case studies. PPE

	(NIPRD-developed). 6.7 Describe scorpions and spiders. 6.8 Describe effects of toxic gases: CO, NH₃, H₂S, methane in poultry/swine housing. 6.9 Mention household and farm chemicals: bleach, detergents, kerosene, palm-oil-mill effluents. 6.10 Discuss general supportive therapy principles for poisoning. 6.11 Describe ethylene glycol (antifreeze), strychnine, methaldehyde toxicities	• Describe scorpions and spiders. • Explain the effects of toxic gases: CO, NH₃, H₂S, methane in poultry/swine housing. • List household and farm chemicals: bleach, detergents, kerosene, palm-oil-mill effluents. • Explain general supportive therapy principles for poisoning. • Explain ethylene glycol (antifreeze), strychnine, methaldehyde toxicities.				
GENERAL OBJECTIVE 7.0: Apply correct sample collection for suspected poisoning cases.						
12	7.1 Outline sample types: stomach contents, blood, urine, faeces, liver, kidney, brain, hair, suspect feed, suspect water, suspect plants. 7.2 Describe how to collect samples for toxicological analysis 7.3 Describe appropriate fixation: chilled (-20 °C) for chemical analysis; 10	• List sample types: stomach contents, blood, urine, faeces, liver, kidney, brain, hair, suspect feed, suspect water, suspect plants. • Explain how to collect samples for analysis • Explain appropriate fixation: chilled (-20 °C) for chemical analysis; 10 % NBF for histology. • Explain sample integrity:	Reference textbooks. Projector. Internet White board marker Charts	• Collect sample on a simulated poisoning case. • Compose a chain-of-custody form for a forensic poisoning case. • Apply triple-packaging on a sample. • Develop a	Guide students to: • Collect sample on a simulated poisoning case. • Compose a chain-of-custody form for a forensic poisoning case. • Apply triple-packaging on a	Cadaver/scenario. Custody form. IATA materials. File template. Sample collection materials Case animal PPE

	% NBF for histology. 7.4 Discuss sample integrity: appropriate container (glass for solvents; plastic for some agents), no preservative interfering with analysis. 7.5 Discuss chain-of-custody documentation for forensic cases. 7.6 Discuss minimum sample volumes (e.g. 50 g liver; 5 mL serum). 7.7 Describe suspected feed (1 kg), water (500 mL), plant material (whole plant if possible). 7.8 Describe standardized forensic-sample collection (mortuary, scene, lab). 7.9 Discuss the importance of complete history: feeding, drug use, environment, signs. 7.10 Describe photographic record where appropriate. 7.11 Discuss triple-packaging shipment.	appropriate container (glass for solvents; plastic for some agents), no preservative interfering with analysis. • Explain chain-of-custody documentation for forensic cases. • Explain minimum sample volumes (e.g. 50 g liver; 5 mL serum). • Identify suspected feed (1 kg), water (500 mL), plant material (whole plant if possible). • Explain standardized forensic-sample collection (mortuary, scene, lab). • Explain the importance of complete history: feeding, drug use, environment, signs. • Identify photographic record where appropriate. • Explain triple-packaging shipment.		poisoning-case file with photos.	sample. • Develop a poisoning-case file with photos.	
GENERAL OBJECTIVE 8.0: Know analytical laboratory techniques in toxicology.						
13	8.1 Mention screening tools:	• List screening tools: TLC,	Charts.	• Apply	Guide students to:	Laboratory

	TLC, ELISA, immunoassay. 8.2 Define: - Spectrophotometric assays Atomic Absorption Spectroscopy (AAS) - Gas Chromatography-Mass Spectrometry (GC-MS) - HPLC, LC-MS for non-volatile toxicants. 8.3 Describe the uses of: - spectrophotometric assays Atomic Absorption Spectroscopy (AAS) - Gas Chromatography-Mass Spectrometry (GC-MS) - HPLC, LC-MS for non-volatile toxicants. 8.4 List reference labs: NVRI, NAFDAC, NIPRD, university toxicology labs.	ELISA, immunoassay. - Discuss: - Spectrophotometric assays Atomic Absorption Spectroscopy (AAS) - Gas Chromatography-Mass Spectrometry (GC-MS) - HPLC, LC-MS for non-volatile toxicants. - Explain the uses of: - Spectrophotometric assays Atomic Absorption Spectroscopy (AAS) - Gas Chromatography-Mass Spectrometry (GC-MS) - HPLC, LC-MS for non-volatile toxicants. - List reference labs: NVRI, NAFDAC, NIPRD, university toxicology labs.	Projector white board, Marker Text books, Internet. Lecture note, etc.	spectrophotometric assays. - Apply Gas Chromatography-Mass Spectrometry (GC-MS) - Apply HPLC, LC-MS for non-volatile toxicants	- Apply Apply spectrophotometric assays. - Apply Gas Chromatography-Mass Spectrometry (GC-MS) - Apply HPLC, LC-MS for non-volatile toxicants	Instruments Test kit. Reagents. AAS. TLC kit. QC log. PPE
GENERAL OBJECTIVE 9.0: Comprehend forensic, regulatory and One Health frameworks.						

14-15	9.1 Discuss forensic-toxicology principles in veterinary practice (especially mass animal poisoning). 9.2 Discuss NAFDAC regulation of veterinary drugs, pesticides and food residues. 9.3 Discuss NESREA regulation of pesticide use and disposal. 9.4 Discuss SON product standards. 9.5 Discuss FMARD's role in feed and animal-health. 9.6 Discuss FAO/WHO Codex Maximum Residue Limits (MRLs). 9.7 Discuss One Health framework to toxicology (link to VLT 219). 9.8 Discuss Veterinary Council of Nigeria (VCN) ethics of toxicology. 9.9 Discuss integrated knowledge to a capstone poisoning investigation. 9.10 Describe the final toxicology investigation report.	• Explain forensic-toxicology principles in veterinary practice (especially mass animal poisoning). • Explain NAFDAC regulation of veterinary drugs, pesticides and food residues. • Explain NESREA regulation of pesticide use and disposal. • Explain SON product standards. • Mention FMARD's role in feed and animal-health. • Explain FAO/WHO Codex Maximum Residue Limits (MRLs). • Explain One Health framework to toxicology (link to VLT 219). • Explain Veterinary Council of Nigeria (VCN) ethics of toxicology. • Explain the final toxicology investigation report.	Charts. Projector white board, Marker Text books, Internet. Lecture note, etc.	• Apply integrated knowledge to a Nigerian poisoning case. • Compose the final toxicology investigation report. • Submit the capstone case.	Guide students to: • Apply integrated knowledge to a Nigerian poisoning case. • Compose the final toxicology investigation report. • Submit the capstone case.	Case file. Report template. Submission portal. Assessment. Computer External hard drive Cloud Storage
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COURSE ASSESSMENT

Course Work: 10%

Tests: 10%

Practical: 40%

Examination: 40%

Total: 100%



MEAT INSPECTION AND ABATTOIR LABORATORY PRACTICE**PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY**

COURSE TITLE: MEAT INSPECTION AND ABATTOIR LABORATORY PRACTICE	COURSE CODE: VLT 223	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOURS/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with the knowledge and skills to learn modern meat inspection and abattoir laboratory protocols.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know Meat Hygiene and Abattoir Practice 2.0 Know anatomy, physiology, and diseases of Food Animals 3.0 Know Ante-Mortem Inspection (Live Animal Inspection) 4.0 Know Post-Mortem Inspection (Meat Inspection) 5.0 Know Abattoir Lab Practices and HACCP		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: MEAT INSPECTION AND ABATTOIR LABORATORY PRACTICE		COURSE CODE: VLT 223		CONTACT HOURS: 3 HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1 HOURS/WEEK		
YEAR: II SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 2 HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and skills to learn modern meat inspection and abattoir laboratory protocols.						
General Objective 1.0: Know Meat Hygiene and Abattoir Practice						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-4	1.1 Describe Abattoir Design and Hygiene 1.2 Describe Layout of abattoir and slaughter slabs 1.3 Explain lairage management 1.4 Explain sanitation. 1.5 Describe Regulatory Framework 1.6 Explain local meat inspection laws 1.7 Explain Personal Hygiene 1.8 List Requirements for staff to prevent cross-contamination.	• Explain Abattoir Design & Hygiene • Explain Layout of abattoir and slaughter slabs • Explain lairage management • Explain sanitation. • Explain Regulatory Framework • Explain local meat inspection laws • Explain Personal Hygiene • State requirements for staff to prevent cross-contamination.	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Observe abattoir design and hygiene • Observe lairage • Observe sanitation	Guide students to; • Observe abattoir design and hygiene • Observe lairage • Observe sanitation	Logistics Study tour guide
General Objective 2.0: Know Anatomy, Physiology, and Diseases of Food Animals						

5-8	2.1 Explain Anatomical Structure of food animals (cattle, sheep, pigs, poultry). 2.2 Explain basic gross Pathology 2.3 Explain the physiological functions of the body systems of food animals	• Explain Anatomical Structure of food animals (cattle, sheep, pigs, poultry). • Explain basic gross Pathology • Explain the physiological functions of the body systems of food animals	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.			
General Objective 3.0: Know Ante-Mortem Inspection (Live Animal Inspection)						
9-11	3.1 Explain procedures for behavior, gait, nutrition status, and hide inspection. 3.2 Describe Judgment for separating animals for slaughter, emergency slaughter, or condemnation. 3.3 Explain the purpose of ante-mortem inspection in ensuring food safety and animal welfare	• Explain procedures for behavior, gait, nutrition status, and hide inspection. • Explain Judgment for separating animals for slaughter, emergency slaughter, or condemnation. • Explain the purpose of ante-mortem inspection in ensuring food safety and animal welfare	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.	• Observe behavior, gait, nutrition status, and hide of food animals in lairage • Separate animals for slaughter, emergency slaughter, or condemnation.	Guide students to; • Observe behavior, gait, nutrition status, and hide of food animals in lairage • Separate animals for slaughter, emergency slaughter, or condemnation	logistics
General Objective 4.0: Post-Mortem Inspection (Meat Inspection)						
12-15	4.1 Explain inspection techniques for incision and examination of lymph nodes, organs, and carcasses.	• Describe inspection techniques for incision and examination of lymph	Whiteboard and marker, Projector, charts, textbooks,	• Observe technique for examination of organs • Observe technique for examination of meat	Guide students to: • Observe technique for examination of organs	logistics

	4.2 Explain specific procedures for Head, viscera, and carcass inspections (including cattle, pigs, poultry). 4.3 Explain condemnation procedures for handling and disposal of condemned meat.	nodes, organs, and carcasses. • Describe specific procedures for Head, viscera, and carcass inspections (including cattle, pigs, poultry). • Describe condemnation procedures for handling and disposal of condemned meat.	internet, lecture notes, etc.	byproducts	• Observe technique for examination of meat byproducts	
COURSE ASSESSMENT: Course work: 10% Test: 10% Practical: 40% Examination: 40% Total: 100%						

VETERINARY LABORATORY ENTREPRENEURSHIP

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE: VETERINARY LABORATORY ENTREPRENEURSHIP	COURSE CODE: VLT 224	CREDIT UNIT: 2 HOURS/WEEK
	CONTACT HOURS: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with knowledge and skills for establishing, managing, and sustaining veterinary laboratory-related enterprises.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept of entrepreneurship in veterinary laboratory technology; 2.0 Know business opportunities in veterinary laboratory services and allied sectors; 3.0 Know how to prepare a simple business plan for a veterinary laboratory enterprise; 4.0 Know basic skills in business management, record keeping, and customer relations; 5.0 Apply principles of marketing and financial management in veterinary laboratory businesses; 6.0 Understand relevant legal, ethical, and regulatory requirements guiding veterinary laboratory enterprises; 7.0 Know digital tools and innovation for veterinary laboratory business development and service delivery; 8.0 Understand entrepreneurial attitudes such as creativity, leadership, teamwork, and problem-solving.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE: VETERINARY LABORATORY ENTREPRENEURSHIP			COURSE CODE: VLT 224	CREDIT UNIT: 2 HOURS/WEEK		
			CONTACT HOURS: 2	THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II			PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills for establishing, managing, and sustaining veterinary laboratory-related enterprises.						
General Objective 1.0: Explain the concept and importance of entrepreneurship in veterinary laboratory technology						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define entrepreneurship and entrepreneur 1.2 State the importance of entrepreneurship in VLT 1.3 Outline the characteristics of successful entrepreneurs	- Explain entrepreneurship and entrepreneur - Discuss the importance of entrepreneurship in VLT - Explain the characteristics of successful entrepreneurs	Whiteboard, marker, lecture notes Charts, projector Case studies, handouts Internet			
General Objective 2.0: Identify business opportunities in veterinary laboratory services and allied sectors						
2-3	2.1 State various veterinary laboratory business opportunities.. 2.2 Explain market needs for laboratory services.	- Outline various veterinary laboratory business opportunities.. - Discuss market needs	Whiteboard, marker, lecture notes Charts, projector			

	2.3 Describe potential allied business ventures linked to VLT.	for laboratory services. • Explain potential allied business ventures linked to VLT.	Case studies, handouts Internet			
General Objective 3.0: Know how to business plan for a veterinary laboratory enterprise						
4-5	2.1 Explain business plan 2.2 Explain components of a business plan 2.3 State the importance of a business plan	• Explain business plan • Explain components of a business plan • Discuss the importance of business planning	Whiteboard, marker, lecture notes Charts, projector Case studies, handouts Internet	• Develop a simple business plan for a veterinary laboratory enterprise. • Present and defend a business idea.	Guide students to: • Develop a simple business plan for a veterinary laboratory enterprise. • Present and defend a business idea	Business plan templates Sample veterinary laboratory business plans Business Model Canvas Financial planning worksheets
General Objective 4.0: Know basic skills in business management, record keeping, and customer relations						
6-7	4.1 Explain basic business management principles 4.2 Describe simple record keeping methods 4.3 Explain good customer relations practices	• Discuss basic business management principles • Describe simple record keeping methods • Explain good customer relations practices	Lecture notes Sample record books Charts White board Marker Internet Projector	• Demonstrate basic business management skills. • Maintain accurate business records. • Apply effective customer	Guide students to: • Demonstrate basic business management skills. • Maintain accurate business records. • Apply effective customer	Record sheets, role-play materials
General Objective 5.0: Apply principles of marketing and financial management in veterinary laboratory businesses						

8-9	5.1 Explain basic marketing principles 5.2 Describe simple financial management practices 5.3 Explain marketing strategy for laboratory services.	• Explain basic marketing principles • Describe simple financial management practices • Explain marketing strategy for laboratory services	Charts, projector Calculator, lecture notes White board Marker Internet	• Prepare a simple budget for a veterinary laboratory business • Analyze profitability and pricing strategies.	Guide students: • Prepare a simple budget for a veterinary laboratory business • Analyze profitability and pricing strategies.	Social media platforms Accounting spreadsheets Marketing plan templates Budgeting software
General Objective 6.0: Understand relevant legal, ethical, and regulatory requirements guiding veterinary laboratory enterprises						
10-11	6.1 Explain legal requirements for establishing a veterinary laboratory business. 6.2 Explain ethical principles in laboratory entrepreneurship. 6.3 Outline regulatory standards and licensing requirements.	• Describe legal requirements for establishing a veterinary laboratory business. • Discuss ethical principles in laboratory entrepreneurship. • Explain regulatory standards and licensing requirements.	Charts, projector Calculator, lecture notes White board Marker Internet	• Identify agencies involved in business regulation • Carry out business registration procedures • Search licensing requirements, Laboratory accreditation • Carry out biosecurity measures • Apply ethical principles in laboratory entrepreneurship	Guide students to: • Identify agencies involved in business regulation • Carry out business registration procedures • Search licensing requirements, Laboratory accreditation • Carry out biosecurity measures • Apply ethical principles in laboratory entrepreneurship	Internet resources, notebooks National veterinary regulations Veterinary council guidelines Laboratory quality standards manuals Ethics codes and policy documents

General Objective 7.0: Know digital tools and innovation for veterinary laboratory business development and service delivery						
12-13	7.1 List digital tools used in veterinary laboratory enterprises business 7.2 Explain the role of innovation in entrepreneurship 7.3 Explain the uses of digital tools for communication, marketing, and record management.	• Discuss digital tools used in veterinary laboratory enterprises business • Describe the role of innovation in entrepreneurship • Explain the uses of digital tools for communication, marketing, and record management.	Computer, smartphone Projector, internet access White board Marker	• Identify digital technologies used in veterinary laboratory enterprises. • Use digital tools for communication, marketing, and record management. • Explore innovative approaches to service delivery.	Guide students to: • Identify digital technologies used in veterinary laboratory enterprises. • Use digital tools for communication, marketing, and record management. • Explore innovative approaches to service delivery.	LIMS software demonstrations Social media platforms Cloud storage tools Online learning platforms Business analytics applications
General Objective 8.0: Understand entrepreneurial attitudes such as creativity, leadership, teamwork, and problem-solving						
14-15	8.1 Explain entrepreneurial attitudes and values 8.2 Describe problem-solving techniques in business 8.3 Demonstrate creativity in solving business challenges. 8.4 Explain leadership and teamwork skills.	• Explain entrepreneurial attitudes and values • Describe problem-solving techniques in business • Demonstrate creativity in solving business challenges. • Explain leadership and teamwork skills.	Computer, smartphone Projector, internet access White board Marker	• Demonstrate creativity in solving business challenges. • Exhibit leadership and teamwork skills. • Apply problem-solving techniques in business situations.	• Demonstrate creativity in solving business challenges. • Exhibit leadership and teamwork skills. • Apply problem-solving techniques in business situations.	Leadership development materials Entrepreneurship simulations Case study discussions Problem-solving frameworks

COURSE ASSESSMENT

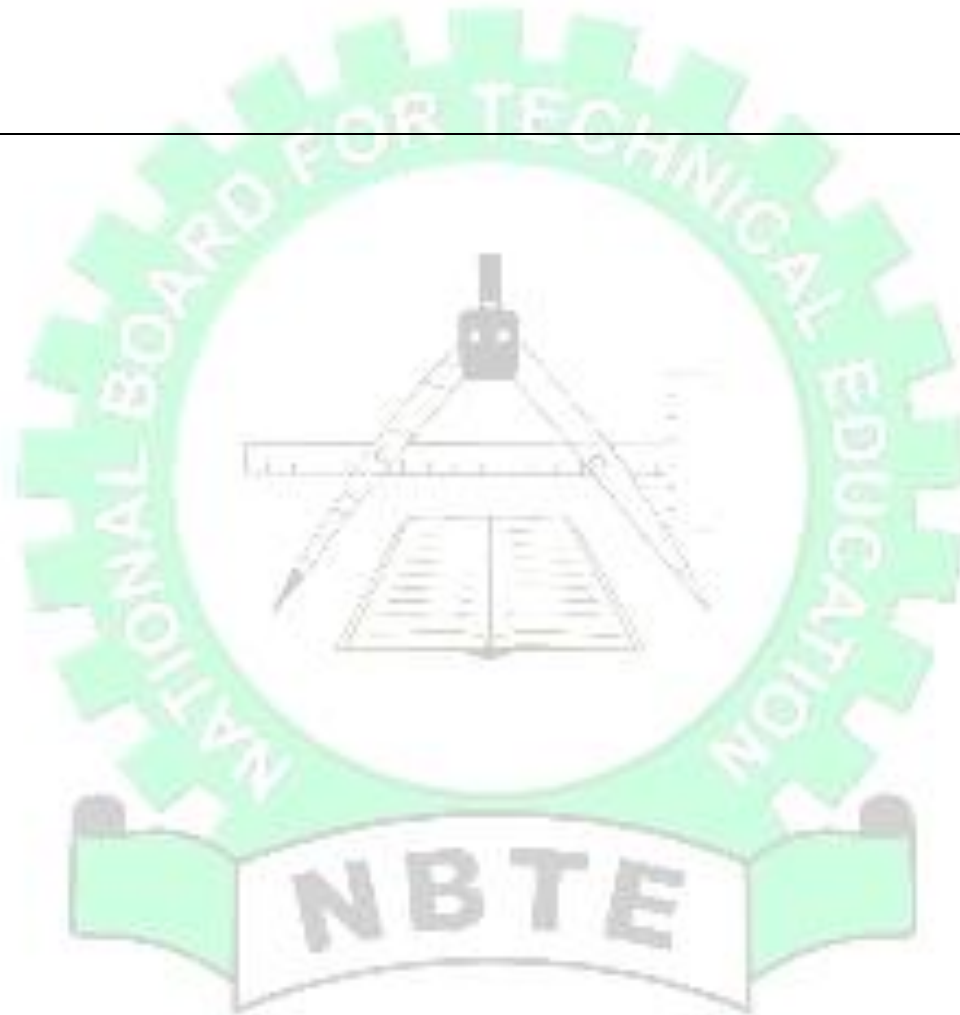
Course Work: 10%

Tests: 10%

Practical: 40%

Examination: 40%

Total: 100%



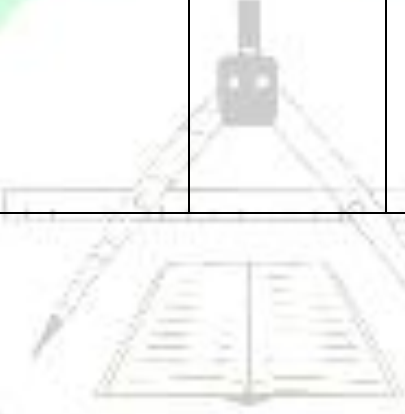
RADIOLOGY

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: RADIOLOGY	COURSE CODE: VLT 225	CONTACT HOURS: 2 HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER :II	PRE-REQUISITE:	PRACTICAL: 1 HOUR/WEEK
GOAL: This course is designed to equip students with the knowledge and skills of principles and application of veterinary radiology.		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles and scope of veterinary radiology; 2.0 Understand radiation physics and X-ray production; 3.0 Understand radiographic equipment and accessories; 4.0 Understand radiation hazard, protection and safety measures; 5.0 Understand animal positioning and restraint for radiography; 6.0 Understand radiographic film processing, image; 7.0 Understand contrast radiography and ultrasonography.		

PROGRAMME: NATIONAL DIPLOMA (ND) IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: RADIOLOGY			COURSE CODE: VLT 225		CONTACT HOURS: 2 HOURS/WEEK	
			CREDIT UNIT: 2		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER :II			PRE-REQUISITE:		PRACTICAL: 1 HOUR/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and skills of principles and application of veterinary radiology.						
GENERAL OBJECTIVE 1.0: Understand the principles and scope of veterinary radiology.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Define veterinary radiology and diagnostic imaging. 1.2 Explain branches of radiology. 1.3 Explain the application of radiology in veterinary practice.	• Describe veterinary radiology and diagnostic imaging. • Discuss branches of radiology. • Discuss the application of radiology in veterinary practice.	Whiteboard and marker, Projector, charts, textbooks, internet, lecture notes, etc.			
General Objective 2.0: Understand radiation physics and X-ray production						
3-4	2.1 Define electromagnetic radiation. 2.2 List the types of radiation 2.3 Explain X-ray production. 2.4 List properties of X-rays. 2.5 State the concept of X-ray production. 2.6 Outline the functions of	• Describe electromagnetic radiation • List the types of radiation • Describe X-ray production • Describe the properties of X-ray. • Explain the concept of X-ray production • Discuss the functions of the components of X-ray machine	Whiteboard and marker, X-ray tube diagrams, charts, internet, projectors, lecture notes			

	the components of X-ray machine					
General Objective 3.0: Understand radiographic equipment and accessories						
5-6	3.1 Explain X-ray tubes, cassettes, grids and intensifying screens 3.2 Explain the functions of accessories. 3.3 Explain the maintenance of radiographic equipment and its accessories	- Describe X-ray tubes, cassettes, grids and intensifying screens - Discuss the functions of accessories. - Explain the maintenance of radiographic equipment and its accessories	Whiteboard and marker, lecture notes, charts, internet, projector, models.	- Identify radiographic equipment and their accessories. - Identify the essential part of radiographic equipment. - Identify the functions associated with radiographic machine and its accessories.	Guide students to: - Identify radiographic equipment and their accessories. - Identify the essential part of radiographic equipment. - Identify the functions associated with radiographic machine and its accessories.	Cassettes, grids, screens. radiographic accessories, PPE,
General Objective 4.0: Understand radiation hazard, protection and safety measures						
7-8	4.1 Explain hazards of radiation. 4.2 Explain radiation protection principles. 4.3 Explain safety regulations 4.4 Describe the practice of safeguarding people and environment from the effect of ionizing radiations.	- Describe hazards of radiation. - Discuss radiation protection principles. - Discuss safety regulations - Describe the practice of safeguarding people and environment from the effect of ionizing radiations.	Whiteboard and marker, charts, lectures notes, projector, internet,	- Demonstrate wearing of protective devices correctly. - Measure safe positioning during exposure.	Guide the student to; - Participate in wearing of protective devices correctly. - Participate in safe positioning during exposure.	Lead aprons, dosimeters, lead glass shield, collimators, PPE.
General Objective 5.0: Understand animal positioning and restraint for radiography.						

9-10	5.1 Explain positioning techniques. 5.2 Explain restraint methods during radiography. 5.3 List common projections.	• Explain positioning techniques. • Discuss restraint methods during radiography. • Describe common projections.	Whiteboard and marker. Positioning charts, textbooks, internet Lecture note	• Demonstrates Positioning animals for thoracic and abdominal radiographs. • Apply restraint techniques.	Guide the student to; • Demonstrates Positioning animals for thoracic and abdominal radiograph. • Apply restraint techniques.	Animal models/live animals, sandbags, tapes, foam wedge-trough, PPE X-ray machine Radiographic (board, film, viewer) Radiographic sensor Samples of radiographic images
General Objective 6.0: Understand radiographic film processing, image.						
11-12	6.1 Explain film processing. 6.2 Explain radiographic exposure factors. 6.3 Describe radiographic image quality 6.4 Explain some skeletal disorders.	• Explain film processing. • Describe radiographic exposure factors. • Explain radiographic image quality • Discuss some skeletal disorders.	Whiteboard and marker, chemicals, projectors, anatomy atlas, internet, charts.	• Demonstrate darkroom procedures • Evaluate radiographic quality • Identify normal and abnormal radiograph • Recognize abnormal radiographic findings	Guide student to; • Demonstrate darkroom procedures • Evaluate radiographic quality • Identify normal and abnormal radiograph • Recognize abnormal radiographic findings	Developer, fixer, films. PPE, live animal adiograph images, dark room, radiographic films, radiographic viewing box

General Objective 7.0: Understand contrast radiography and ultrasonography						
13-15	7.1 Define contrast techniques. 7.2 List contrast media. 7.3 Define ultrasonography. 7.4 Outline the indication of ultrasonography 7.5 List the component of ultrasound machine.	- Describe contrast techniques. Describe contrast media - Discuss the indication for ultrasonography. - Describe the component of ultrasound machine	Whiteboard and marker, projector charts and textbooks, image charts, Internet 	- Identify ultrasound machines and its components - Identify contrast media	Guide student to; - Identify ultrasound machines and its component - Identify contrast media	Contrast agents, syringes. Videos of contrast media application PPE, Ultrasound machine, gel Ultrasound probe. Samples images
COURSE ASSESSMENT Course Work: 10% Tests: 10% Practical: 40% Examination: 40% Total: 100%						

VETERINARY NURSING

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY		
COURSE TITLE: VETERINARY NURSING	COURSE CODE: VLT 226	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE: VLT 125	PRACTICAL: 2 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in veterinary nursing.		
GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Comprehend the role, scope and ethics of veterinary nursing; 2.0 Apply the nursing process: assessment, diagnosis, planning, implementation, evaluation; 3.0 Know how to conduct physical examination and record vital signs; 4.0 Administer medication via oral, parenteral, topical and inhalational routes; 5.0 Apply fluid therapy and IV catheter management; 6.0 Apply species-specific nursing to ruminants, monogastrics and companion animals; 7.0 Apply nursing for critically ill, recumbent and rehabilitation patients; 8.0 Apply nutritional and feeding support to hospitalized patients; 9.0 Apply client communication, discharge planning and welfare considerations.		

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: VETERINARY NURSING			COURSE CODE: VLT 226		CONTACT HOURS: 3 HOURS/WEEK	
			CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK	
YEAR: II SEMESTER: II			PRE-REQUISITE: VLT 125		PRACTICAL: 2 HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in veterinary nursing.						
GENERAL OBJECTIVE 1.0: Comprehend the role, scope and ethics of veterinary nursing.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Define veterinary nursing. 1.2 Distinguish veterinary nurse, veterinary technologist and veterinarian roles. 1.3 Explain the Veterinary Council of Nigeria (VCN) scope of practice for veterinary paraprofessionals (VPP). 1.4 Explain ethical principles: care,	- Define veterinary nursing. - Differentiate the roles of veterinary nurse, veterinary technologist and veterinarian - Discuss the Veterinary Council of Nigeria (VCN) scope of practice for veterinary paraprofessionals (VPP). - Discuss ethical	Whiteboard, Marker, Projector, Reference textbooks, (BSAVA Manual; Aspinall), VCN materials, Internet.			

	advocacy, confidentiality, competence, professionalism. 1.5 Identify the 5 Freedoms of animal welfare. 1.6 Define patient-centred nursing. 1.7 Mention the roles of the VLT graduate in nursing support.	principles: care, advocacy, confidentiality, competence, professionalism. • Describe the 5 Freedoms of animal welfare. • Discuss patient-centred nursing. • Discuss the role of the VLT graduate in nursing support.				
GENERAL OBJECTIVE 2.0: Apply the nursing process: assessment, diagnosis, planning, implementation, and evaluation.						
2	2.1 Describe the nursing process: ADPIE (Assessment, Diagnosis, Planning, Implementation, Evaluation). 2.2 Describe patient assessment: signalment, history, presenting complaint, physical exam. 2.3 Discuss nursing	• Explain the nursing process: ADPIE (Assessment, Diagnosis, Planning, Implementation, Evaluation). • Explain patient assessment: signalment, history, presenting complaint, physical exam. • Explain nursing	Reference textbooks, Projector, Internet, White board, Marker, etc.	• Compose a nursing care plan for a hypothetical hospitalized cattle case. • Develop a kennel chart for a 24-hour period. • Apply SBAR in a mock handover. • Conduct nursing assessment on a model or live patient.	Guide students to: • Compose a nursing care plan for a hypothetical hospitalised cattle case. • Develop a kennel chart for a 24-hour period. • Apply SBAR in a mock handover. • Conduct nursing assessment on a model or live patient.	Case scenario, Chart template, Mock setup, Patient access, PPE.

	diagnoses (e.g. “inability to maintain hydration”). 2.4 Discuss nursing diagnosis and veterinary diagnosis. 2.5 Describe a nursing care plan with goals, interventions, evaluation criteria. 2.6 Discuss the Roper-Logan-Tierney model (Activities of Daily Living). 2.7 Discuss SBAR (Situation, Background, Assessment, Recommendation) communication. 2.8 Discuss nursing records: kennel chart, ICU chart, treatment record. 2.9 Discuss nursing handover (shift change)	diagnoses (e.g. “inability to maintain hydration”). • Distinguish nursing diagnosis from veterinary diagnosis. • Explain a nursing care plan with goals, interventions, evaluation criteria. • Explain the Roper-Logan-Tierney model (Activities of Daily Living). • Explain SBAR (Situation, Background, Assessment, Recommendation) communication. • Explain nursing records: kennel chart, ICU chart, treatment record. • Explain nursing handover (shift change).				
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GENERAL OBJECTIVE 3.0: Know how to conduct physical examination and record vital signs.						
3-4	3.1 Describe systematic physical EXAMINATION: 60%TPR (temperature, pulse, respiration) plus general appearance, mucous membranes, capillary refill, lymph nodes, hydration. 3.2 Discuss TPR measurement: cattle 38.0–39.3 °C, HR 60–80 bpm, RR 15–40; sheep/goat 38.5–40.0 °C, HR 70–90, RR 20–40; dog 37.5–39.0 °C, HR 60–140, RR 10–30; cat 38.0–39.0 °C, HR 110–220, RR 20–30. 3.3 Describe mucous-membrane colour: pink (normal),	• Explain systematic physical EXAMINATION: 60%TPR (temperature, pulse, respiration) plus general appearance, mucous membranes, capillary refill, lymph nodes, hydration. • Explain TPR measurement: cattle 38.0–39.3 °C, HR 60–80 bpm, RR 15–40; sheep/goat 38.5–40.0 °C, HR 70–90, RR 20–40; dog 37.5–39.0 °C, HR 60–140, RR 10–30; cat 38.0–39.0 °C, HR 110–220, RR 20–30. • Explain mucous-membrane colour: pink (normal),	Reference textbooks, Projector, Internet, White board, Marker, etc.	• Conduct full physical examination and TPR on 3 species. • Score BCS on 5 animals. • Apply pain scoring. • Examine each body system systematically. • Document findings in a structured nursing record.	Guide students to: • Conduct full physical examination and TPR on 3 species. • Score BCS on 5 animals. • Apply pain scoring. • Examine each body system systematically. • Document findings in a structured nursing record.	Patients, Thermometer, Stethoscope, BCS charts, Pain scales, System checklists, Record template, Patient (if available), PPE.

	pale (anaemia, shock), cyanotic (hypoxia), icteric (jaundice), brick-red (shock). 3.4 Describe how to determine capillary refill time (CRT < 2 sec normal). 3.5 Describe hydration: skin tent, eye recession, mucous membranes, body weight. 3.6 Describe how to determine body condition score (BCS): 1–9 scale for dogs/cats; 1–5 or 1–9 for cattle. 3.7 Describe how to determine pain score: Glasgow scale (dog), Botucatu (cat), UNESP (cattle). 3.8 Discuss the cardiovascular, respiratory, gastrointestinal,	pale (anaemia, shock), cyanotic (hypoxia), icteric (jaundice), brick-red (shock). • Define capillary refill time (CRT < 2 sec normal). • Explain hydration: skin tent, eye recession, mucous membranes, body weight. • Explain body condition score (BCS): 1–9 scale for dogs/cats; 1–5 or 1–9 for cattle. • Explain pain score: Glasgow scale (dog), Botucatu (cat), UNESP (cattle). • Explain the cardiovascular, respiratory, gastrointestinal, urinary, neurological systems. • Explain all				
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	urinary, neurological systems. 3.9 Discuss all findings in a structured manner. 3.10 Describe head-to-tail systematic examination.	findings in a structured manner. • Explain head-to-tail systematic examination.				
GENERAL OBJECTIVE 4.0: Administer medication via oral, parenteral, topical and inhalational routes.						
5-6	4.1 Mention the 5 Rights of drug administration: right drug, dose, route, time, patient. 4.2 Describe oral, IV, IM, SC, intradermal, intra-articular, intrathecal, intraperitoneal routes. 4.3 Discuss drug doses by body weight (mg/kg). 4.4 Discuss oral medication: pills, capsules, liquids, drenching for ruminants.	• Explain the 5 Rights of drug administration: right drug, dose, route, time, patient. • Distinguish between oral, IV, IM, SC, intradermal, intra-articular, intrathecal, intraperitoneal routes. • Calculate drug doses by body weight (mg/kg). • Explain oral medication: pills, capsules, liquids, drenching for	Reference textbooks, Projector, Internet, White board, Marker, etc.	• Calculate doses for 10 scenarios. • Administer IM, SC, IV injection on simulators and live animals. • Administer intra-mammary infusion (simulation). • Develop a treatment record. • Recognize controlled-drug handling.	Guide students to: • Calculate doses for 10 scenarios. • Administer IM, SC, IV injection on simulators and live animals. • Administer intra-mammary infusion (simulation). • Develop a treatment record. • Recognize controlled-drug handling.	Calculator, Sample drugs, Simulators, Animals, Drug applicators, Mammary infuser, Record book, Drug schedule, Needles/syringes, PPE.

	4.5 Discuss the 5 Rights of drug administration: right drug, dose, route, time, patient. 4.6 Describe oral, IV, IM, SC, intradermal, intra-articular, intrathecal, intra-peritoneal routes. 4.7 Discuss drug doses by body weight (mg/kg). 4.8 Describe oral medication: pills, capsules, liquids, drenching for ruminants. 4.9 Describe IM injection: cattle (rump, neck), small ruminants (neck), pigs (neck), dogs/cats (epaxial), poultry (breast). 4.10 Describe SC injection. 4.11 Describe IV injection: jugular	ruminants. • Explain IM injection: cattle (rump, neck), small ruminants (neck), pigs (neck), dogs/cats (epaxial), poultry (breast). • Explain SC injection. • Explain IV injection: jugular (cattle, horse), cephalic (dog, cat), wing vein (poultry). • Explain intra-mammary infusion for mastitis. • Explain topical and inhalational therapy. Explain drug-administration records. • Explain controlled drugs (ketamine, opioids) and Nigerian				
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	(cattle, horse), cephalic (dog, cat), wing vein (poultry). 4.12 Describe intra-mammary infusion for mastitis. 4.13 Describe topical and inhalational therapy. 4.14 Discuss drug-administration records. 4.15 Discuss controlled drugs (ketamine, opioids) and Nigerian regulatory requirements. 4.16 Discuss medication-error prevention.	regulatory requirements. • Explain medication-error prevention.				
GENERAL OBJECTIVE 5.0: Apply fluid therapy and IV catheter management.						
7-8	5.1 List common veterinary fluids: crystalloids (lactated Ringer's, NS,	• Explain common veterinary fluids: crystalloids (lactated Ringer's, NS, Hartmann's),	Reference textbooks, Projector, Internet, White board,	• Calculate fluid requirements for 5 scenarios. • Place IV catheter on a simulator or	Guide students to: • Calculate fluid requirements for 5 scenarios. • Place IV catheter	Calculator, Catheters, Patient dressing, Drip set,

	Hartmann's), colloids, blood products. 5.2 Determine how to calculate fluid rates: maintenance (60–80 mL/kg/d), replacement, ongoing losses. 5.3 Mention common Nigerian veterinary fluid abuses: over-rapid IV, fluid overload, hypotonic shock. 5.4 Describe IV catheter placement: cephalic vein (dog/cat), jugular (cattle), ear vein (rabbit). 5.5 Describe catheter maintenance: flush, dressing, monitoring. 5.6 Discuss catheter complications: phlebitis, infiltration,	colloids, blood products. • Explain how to calculate fluid rates: maintenance (60–80 mL/kg/d), replacement, ongoing losses. • Discuss common Nigerian veterinary fluid abuses: over-rapid IV, fluid overload, hypotonic shock. • Explain IV catheter placement: cephalic vein (dog/cat), jugular (cattle), ear vein (rabbit). • Explain catheter maintenance: flush, dressing, monitoring. • List catheter complications: phlebitis, infiltration, blockage. • Explain	Marker, etc.	live patient. • Maintain catheter for 24 h. • Calculate drops per minute. • Apply SC fluid administration. • Maintain fluid record.	on a simulator or live patient. • Maintain catheter for 24 h. • Calculate drops per minute. • Apply SC fluid administration. • Maintain fluid record.	Drip stand, Fluids, Needles/syringes, Record sheet, Patient (if available), Tourniquet.
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	blockage. 5.7 Discuss intraosseous (IO) access in collapsed neonates and small ruminants. 5.8 Discuss subcutaneous fluids for outpatient. 5.9 Discuss fluid overload: jugular distension, tachypnoea, pulmonary oedema. 5.10 Discuss fluid record. 5.11 Discuss how to calculate drops per minute.	intraosseous (IO) access in collapsed neonates and small ruminants. • Explain subcutaneous fluids for outpatient. • Explain for fluid overload: jugular distension, tachypnoea, pulmonary oedema. • Explain fluid record. • Explain how to calculate drops per minute.				
GENERAL OBJECTIVE 6.0: Apply species-specific nursing to ruminants, monogastrics and companion animals.						
9-10	6.1 Describe cattle nursing: restraint (squeeze chute), rumen monitoring,	• Explain cattle nursing: restraint (squeeze chute), rumen monitoring,	Reference textbooks, Projector, Internet,	• Apply nursing care on 3 different species. • Apply low-stress	Guide students to: • Apply nursing care on 3 different species.	Patients, Feline patient, Cattle access, Plan template,

foot care, recumbent care. 6.2 Describe sheep/goat nursing: smaller restraint, hoof care, lambing/kidding assistance. 6.3 Describe swine nursing: piglet care, farrowing, lactation support. 6.4 Describe poultry nursing: brooding temperature, debridement of pecking injuries, leg disorders. 6.5 Describe canine nursing: kennel hygiene, exercise, grooming, behavioural welfare. 6.6 Describe feline nursing: stress-free handling, hiding spaces, low-stress restraint. 6.7 Describe rabbit	foot care, recumbent care. • Explain sheep/goat nursing: smaller restraint, hoof care, lambing/kidding assistance. • Explain swine nursing: piglet care, farrowing, lactation support. • Explain poultry nursing: brooding temperature, debridement of pecking injuries, leg disorders. • Explain canine nursing: kennel hygiene, exercise, grooming, behavioural welfare. • Explain feline nursing: stress-free handling, hiding spaces, low-stress restraint.	White board, Marker, etc.	feline handling. • Apply restraint and care to a cattle patient. • Compose species-specific nursing care plans.	• Apply low-stress feline handling. • Apply restraint and care to a cattle patient. • Compose species-specific nursing care plans.	PPE, Restrain materials.
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	and rodent (lab animal) nursing: cage size, environmental enrichment, gentle handling. 6.8 Describe equine nursing (briefly): box stall, grooming, hoof picking. 6.9 Discuss zoonotic risks in each species. 6.10 Discuss species-specific nutrition during hospitalisation.	• Explain rabbit and rodent (lab animal) nursing: cage size, environmental enrichment, gentle handling. • Explain equine nursing (briefly): box stall, grooming, hoof picking. • Explain zoonotic risks in each species. Explain species-specific nutrition during hospitalisation.				
GENERAL OBJECTIVE 7.0: Apply nursing for critically ill, recumbent and rehabilitation patients.						
11-12	7.1 Describe the critically ill patient: shock, dehydration, organ failure, sepsis. 7.2 Discuss intensive monitoring: q15min vitals, urinary output, mentation.	• Explain the critically ill patient: shock, dehydration, organ failure, sepsis. • Explain intensive monitoring: q15min vitals, urinary output,	Reference textbooks, Projector, Internet, White board, Marker, etc.	• Apply recumbent-patient care: turn, pad, ROM exercise. • Apply CPR on a simulator. • Apply oxygen therapy. • Apply hydrotherapy.	Guide students to: • Apply recumbent-patient care: turn, pad, ROM exercise. • Apply CPR on a simulator. • Apply oxygen therapy. • Apply	Padding patient, CPR simulator, Oxygen setup, Hydrotherapy, ICU chart.

	7.3 Discuss recumbent patient care: turning q2h, padded bedding, joint range of motion, decubitus prevention. 7.4 Describe oxygen therapy: nasal prongs, mask, oxygen cage. 7.5 Describe blood transfusion (basics): donor screening, cross-matching, administration. 7.6 Describe emergency response: triage, basic life support, cardiopulmonary resuscitation (CPR). 7.7 Discuss post-surgical and trauma rehabilitation. 7.8 Describe physical therapy: range of motion, hydrotherapy,	mentation. • Explain recumbent patient care: turning q2h, padded bedding, joint range of motion, decubitus prevention. • Explain oxygen therapy: nasal prongs, mask, oxygen cage. • Explain blood transfusion (basics): donor screening, cross-matching, administration. • Explain emergency response: triage, basic life support, cardiopulmonary resuscitation (CPR). • Explain post-surgical and trauma rehabilitation. • Explain physical therapy: range of		• Maintain ICU chart.	hydrotherapy. • Maintain ICU chart.	
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	massage, electrotherapy basics. 7.9 Discuss behavioural welfare for hospitalised patients: enrichment, social contact, low-stress environment. 7.10 Describe ICU chart.	motion, hydrotherapy, massage, electrotherapy basics. • Explain behavioural welfare for hospitalised patients: enrichment, social contact, low-stress environment. • Explain ICU chart.				
GENERAL OBJECTIVE 8.0: Apply nutritional and feeding support to hospitalized patients.						
13	8.1 Describe Resting Energy Requirement (RER) calculation: $30 \times \text{BW (kg)} + 70$ for small animals. 8.2 Explain RER for stress, infection, surgery. 8.3 Describe enteral feeding options: voluntary feeding, hand feeding,	• Explain Resting Energy Requirement (RER) calculation: $30 \times \text{BW (kg)} + 70$ for small animals. • Explain RER for stress, infection, surgery. • Define enteral feeding options: voluntary feeding, hand feeding,	Reference textbooks, Projector, Internet, White board, Marker, etc.	• Calculate RER for 5 patients. • Apply NG-tube placement (simulation). • Monitor food intake and weight over 3 d. • Compose a nursing nutrition plan.	Guide students to: • Calculate RER for 5 patients. • Apply NG-tube placement (simulation). • Monitor food intake and weight over 3 d. • Compose a nursing nutrition plan.	Calculator, NG simulator, Patient access, Plan template, PPE.

	naso-oesophageal, oesophagostomy, gastrostomy. 8.4 Discuss parenteral nutrition (rare in Nigeria, primarily in referral facilities). 8.5 Discuss therapeutic diets: renal, hepatic, gastrointestinal, low-allergen, recovery. 8.6 Describe force-feeding techniques where appropriate. 8.7 Describe body condition, food intake, weight, defecation. 8.8 Describe species-appropriate feeding: ruminant (forage, transfaunation), poultry (free access), swine, dog, cat. 8.9 Discuss gradual diet transitions. 8.10 Discuss feeding	naso-oesophageal, oesophagostomy, gastrostomy. • Explain parenteral nutrition (rare in Nigeria, primarily in referral facilities). • Explain therapeutic diets: renal, hepatic, gastrointestinal, low-allergen, recovery. • Explain force-feeding techniques where appropriate. • Explain body condition, food intake, weight, defecation. • Explain species-appropriate feeding: ruminant (forage, transfaunation), poultry (free access), swine, dog, cat. • Explain gradual diet transitions.				
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	records.	• Explain feeding records.				
GENERAL OBJECTIVE 9.0: Apply client communication, discharge planning and welfare considerations.						
14-15	9.1 Discuss client communication: empathy, clarity, active listening, respect. 9.2 Discuss telephone triage. 9.3 Discuss consent and confidentiality. 9.4 Discuss discharge planning: instructions, follow-up, medication compliance. 9.5 Discuss written discharge instructions. 9.6 Describe end-of-life nursing: euthanasia preparation, client support, grief. 9.7 Discuss welfare assessment for chronic patients. 9.8 Describe quality-	• Explain client communication: empathy, clarity, active listening, respect. • Explain telephone triage. • Explain consent and confidentiality. • Explain discharge planning: instructions, follow-up, medication compliance. • Explain written discharge instructions. • Explain end-of-life nursing: euthanasia preparation, client support, grief. • Explain welfare assessment for chronic patients.	Reference textbooks, Projector, Internet, White board, Marker, etc.	• Apply communication in a mock client consultation. • Compose written discharge instructions. • Apply quality-of-life scoring on a chronic patient. • Submit the capstone case log. • Sit the final integrated practical and written assessment.	Guide students to: • Apply communication in a mock client consultation. • Compose written discharge instructions. • Apply quality-of-life scoring on a chronic patient. • Submit the capstone case log. • Sit the final integrated practical and written assessment.	Mock setup, Discharge template, Patient access, Log book, PPE.

	of-life scoring. 9.9 Discuss the legal and ethical aspects of euthanasia in Nigeria. 9.10 Discuss integrated nursing knowledge through a capstone patient-care case. 9.11 Describe the capstone log.	• Explain quality-of-life scoring. • Explain the legal and ethical aspects of euthanasia in Nigeria. • Explain integrated nursing knowledge through a capstone patient-care case. • Explain the capstone log.				
COURSE ASSESSMENT Course Work: 10% Tests: 10% Practical: 40% Examination: 40% Total: 100%						

LIST OF MINIMUM RESOURCES/PHYSICAL FACILITIES

S/NO	DESCRIPTION OF ITEM	QUANTITY
A.	RECEPTION:	
1.	Reception chairs	8
2.	Table and chair	1 set
3.	File cabinet	1
B	CLINIC (SMALL AND LARGE ANIMAL)	3
1.	Digital weighing scale	2
2.	Deep Freezer	4
3.	Suction machine	3
4.	Stethoscope	9
5.	Endo- tracheal tube	5
6.	Elizebathal collar	5 sets
7.	Hoof trimmer	4 sets
8.	Orphthamoscope	4
9.	Stomach tube	1
10.	Emasculator	8
11.	Dog catcher	5
12.	Vaginal speculum	2
13.	Small animal examination table	2
14.	Burdizzo	2
15.	Probang	1
16.	Drip stand	1
17.	Medication cabinet	2
18.	Autoclave	2
19.	Steam sterilizer	2
20.	Electric dehorner	1
21.	Gas dehorner	1
22.	Otoscope	3
23.	Obstetric box	1

24.	Knapsack sprayer	4
25.	Clinical thermometer	20
26.	Crush	1
27.	Scale (digital)	5
C	Surgical unit	
1.	Anesthetic machine	3
2.	Theatre lamp	1
3.	Thermo-cautery machine	2
4.	Small animal surgical box	2
5.	Large animal surgical box	1
6.	Post mortem box	2
D	Diagnostic laboratories	
1.	Haemo-analyzer	1
2.	Electrolyte Analyzer	1
3.	Chemical Analyzer	1
4.	Genotype machine	1
5.	Computer-assisted semen analyzer	1
6.	Milk analyzer	2
7.	Deep Freezer	1
8.	Refrigerator	1
9.	Incubator	4
10.	Binocular Microscope	2
11.	Stereo microscope	1
12.	Refractometer	3
13.	Micro-haematocrit centrifuge	2
14.	Micro-haematocrit reader	2
15.	Micro-haematocrit tubes	2
16.	ELISA reader	1
17.	PH meter	4
18.	Haematospin	1
E	Diagnostic imaging Laboratory	

1.	X-Ray machine	1
2.	X-Ray film dryer	1
3.	X-Ray film illuminator	2
4.	X-Ray film hanger	10
5.	X-Ray cabinet	1
6.	Dark room	1
7.	Endoscope cold light source	1
8.	Gastro scope	1
9.	Stabilizer	1
10.	Ultrasound machine	1
F	Pharmacy	
1.	Drug cabinet	2
2.	Refrigerator	1
3.	Drug inventory	1
4.	First aid box	1

LIST OF EQUIPMENTS IN PATHOLOGY LABORATORY

NECROPSY LABORATORY

S/NO	DESCRIPTION OF ITEM	QUANTITY
1.	Room roofed and well protected	1
2.	Sustainable source of water	1
3.	Working bench(stainless steel table)	2
4.	Concrete floor well sloped for easy drainage and cleaning	1
5.	Post mortem kits(knives, scissors, thumb forceps, bone cutter etc)	1
6.	Protective clothing, masks, gloves.	6
7.	Functional deep freezers	1
8.	Source of light(bright)	4point
9.	Glass slides and cover slips	10packs
10.	Stains (Romanowsky)	4 liters
11.	Forms and record books	50 forms,record book 1

12.	Incinerator	1
13.	Board for taking pictures	1
14.	Camera	1
15.	White board for writing interaction	1
16.	Measuring cylinders (500ml,1000ml,2000ml)	3each
17.	Butcher board	1
18.	Stools (furniture) 10pieces	10pieces
19.	Mechanized bone cutter (electric powered)	1

HISTOPATHOLOGY LABORATORY

S/NO	DESCRIPTION OF ITEM	QUANTITY
1.	Fume cabinet	1
2.	Automatic tissue processor	1
3.	Embedding Centre	1
4.	Microtome	1
5.	Paratrimmer	1
6.	Microtome blades (low grade)	1
7.	Laboratory Microwave	1
8.	Floating-out bath	1
9.	Hot plate	1
10.	Laboratory oven	1
11.	Wax dispenser	1
12.	Automatic strainer	1
13.	Dissection kits	1
14.	Dissection platform	1
15.	Centrifuge (table top)	1
16.	Refrigerator	1
17.	Gas cylinder/burner/tripod stand	1 each

18.	Microscope (optical binocular)	1
19.	Microscope(camera-fixed)	1
20.	Staining jars (set)	1
21.	Autoclave	1
22.	Hot air oven	1
23.	Immunostiner	1
24.	Projector	1

CLINICAL CHEMISTRY LABORATORY

S/NO	DESCRIPTION OF ITEM	QUANTITY
1.	Auto chemistry analyzer	1
2.	Auto haemoanalyser	1
3.	Table top centrifuge	1
4.	Micro-haematocrit centrifuge	1
5.	Spectrophotometer	1
6.	Incubator	1
7.	Hot air oven	1
8.	Weighing balance	1
9.	Water bath	1
10.	Micropipette	10 packs
11.	Autoclave	1
12.	Test tubes (glass, plastic)	100 pieces
13.	Test tube rack	1
14.	Measuring cylinder	3
15.	Refrigerator	1
16.	Deep freezer	1
17.	Microscope(optical binocular)	1
18.	Microscope(camera-fixed)	2

19.	Staining jars(set)	1
20.	Pipette tips	5packs

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LIST OF EQUIPMENT IN MICROBIOLOGY LABORATORY

S/NO	ITEM/DESCRIPTION	QTY
1.	BACTERIOLOGICAL EQUIPMENTS	10
2.	Microscope (Binocular)	2
3.	Incubator	1
4.	Hot Air oven	1
5.	Water distiller	2
6.	Autoclave	1
7.	Weighing balance (electronic)	1
8.	Hot plate	1
9.	Colony counter	1
10.	Water bath	1
11.	Refrigerator	1
12.	Deep freezer	1
13.	Anaerobic jar	1
14.	VIROLOGY EQUIPMENT	
15.	Egg Candler	1
16.	CO ₂ incubator	1
17.	Well washer	1
18.	Incubator shaker	1
19.	Vice & clamp	1
20.	Refrigerated centrifuge	1
21.	ELISA Reader	1
22.	Biosafety cabinet (CLASS II)	1
23.	Trough	1
24.	Tiles	1
25.	Revco (-8 ⁰ C)	1
26.	Liquid Nitrogen Jar	1
27.	Centrifuge	1

28.	Tissue Culture	1
29.		1

PARASTOLOGY LABORATORY

S/NO	ITEM/DESCRIPTION	QUANTITY REQUIRED
1.	Microhaematocrit Centrifuge & Reader	1
2.	Refrigerator	1
3.	Bucket centrifuge	2
4.	Hot plate	1
5.	Microscope (Binocular)	10
6.	CO ₂ Incubator	1
7.	Dissecting microscope	1
8.	Hot Air Oven	1
9.	Incubator shaker	1
10.	pH Meter	1
11.	Water bath	1
12.	Weighing Scale	1

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