NATIONAL BOARD FOR TECHNICAL EDUCATION

CURRICULUM AND COURSE SPECIFICATIONS

FOR

NATIONAL DIPLOMA

IN

VETERINARY LABORATORY TECHNOLOGY

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

2018

GENERAL INFORMATION

1.0 TITLE OF THE PROGRAMME

The programme is National Diploma in **Veterinary Laboratory Technology**

2.0 PROGRAMME GOAL

The goal of the National Diploma (ND) in **Veterinary Laboratory Technology** programme is to produce diplomatescapable of providing clinical and laboratory support to veterinarians and registered Veterinary Para-Professionals.

3.0 PROGRAMME OBJECTIVES

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

i. Assist anesthetists, calculate drug dosages, and assist in invasive medical procedures.
ii. Carry out sample collection and processing under the supervision of a veterinarian.
iii. train diplomates in the field of veterinary laboratory technology who can effectively utilize their training to establish and manage their own veterinary laboratories.
iv. Assist in management of veterinary and diagnostic laboratories, livestock farms and associated production processes.
v. Assist in provision of animal care services in veterinary hospitals/clinics, research institutions, farms and other livestock facilities.

4.0 ENTRY REQUIREMENTS INTO THE PROGRAMME

NATIONAL DIPLOMA (ND)

The academic requirements for admission into the ND programmein **Veterinary Laboratory Technology** are:

I. Five (5) credit passes in GCE “O” level or Senior Secondary Certificate (SSCE), NECO NABTEB at not more than two sittings. The five subjects must include Mathematics, English language and any three (3) others chosen from; Physics, Chemistry and Biology/Health Science/Agricultural Science/Animal Husbandry.

II. Admission will be through the Joint Admission and Matriculation Board (JAMB) having met condition I above and scored up to the requisite cut-off point

5.0 PROGRAMME DURATION:

The ND programme runs for two academic sessions of two semesters each (four semesters).

6.0 CURRICULUM

6.1 The curriculum is structured into four semesters of classroom, studio, laboratories and other field activities. Each semester of educational based activities shall be for a duration of 17 weeks distributed as follows:

(i.) 15 contact weeks of teaching, i.e. theory, practical, exercises, quizzes, tests, etc.; and

(ii.) 2 weeks for examination and registration.

6.2 The curriculum of the programme consists of four main components viz:

i) General Studies Courses
ii) Foundation Courses
iii) Professional Courses
iv) Supervised Industrial Work Experience Scheme (SIWES)

The General Studies component includes courses in General Sciences, English Language/Communication, Entrepreneurship Development and Computer Studies.

The General Education Courses shall account for not more than 10-15% of the total contact hours for the programme.

Foundation Courses:Research Methods, Law courses etc. The number of hours for the foundation courses shall be between 10-15% of the total contact hours for the programme.

Professional Courses are specialised core courses, which give the student the theory and practical skills he/she needs to practice in his/her field of specialisation at the technical level.

Those specialised core courses account for between 60-70% of the total contact hours of the programme.

7.0 PROJECT

Every ND student is required to successfully complete a project in the field of **Veterinary Laboratory Technology**during his/her final year on the programme. Adequate project supervision/assessment should be done by qualified lecturers.

8.0 EVALUATION

For the purpose of awarding the National Diploma (ND) in **Veterinary Laboratory Technology**Certificate, evaluation of the student's work shall include: examinations, project and course work (tests, quizzes, practical etc.). The weighting of each of the components of the evaluation system shall be prescribed by the National Board for Technical Education and the institutions running the programme.

9.0 CONDITIONS FOR THE AWARD OF THE NATIONAL DIPLOMA

9.1 The National Board for Technical Education (NBTE) shall accredit the ND programme in **Veterinary Laboratory Technology**before the award of the diploma certificate. Details about the process of accrediting programmes for the award of National Diploma shall be in line with guidelines from the Executive Secretary, (NBTE), Plot B, Bida Road, P.M.B 2239, Kaduna Nigeria or www.nbte.gov.ng.

9.2 The institution will award the National Diploma to candidates who successfully completed the programme after passing the prescribed coursework, examination, and diploma project. Such candidates should have completed between 72-80 semester credit units as prescribed in the programme.

9.3 The National Diploma (ND) **Veterinary Laboratory Technology**shall be awarded to only persons who have satisfied all conditions for the award of the certificate as laid down by the National Board for Technical Education (NBTE) and the institution in which the programme is offered.

10.0 CLASSIFICATION/GRADING SYSTEM OF DIPLOMAS:

National Diploma (ND) shall be based on a total scale of 4 points classified into the following categories:

Distinction - CGPA of 3.50 and above

Upper Credit - CGPA of 3.00 – 3.49

Lower Credit - CGPA of 2.50 – 2.99

Pass - CGPA of 2.00 – 2.49

MARKED RANGE	LETTER GRADE	WEIGHTING
75% and Above	A	4.00
70% - 74%	AB	3.50
65% - 69%	B	3.25
60% - 64%	BC	3.00
55% - 59%	C	2.75
50% - 54%	CD	2.50

45% - 49%	D	2.25
40% - 44%	E	2.00
Below 40%	F	0.00

11.0 ACCREDITATION OF PROGRAMMES

This programme shall be accredited by the National Board for Technical Education (NBTE) in conjunction with Veterinary Council of Nigeria (VCN).

12.0 GUIDANCE NOTES FOR TEACHERS OF THE PROGRAMME

12.1 The curriculum is drawn in course units. This is in keeping with the provision of the National Policy on Education, which stresses the need to introduce semester credit unit to enable a student who wishes to transfer the units already completed in an institution of similar standard from which he is transferring.

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

12.3 As the success of the credit unit system depends on the articulation of programmes in the institutions and industry, the curriculum content has been written in behavioural objectives, so that it is clear to all, the expected performance of the student who successfully complete the programme.

12.4 The teaching of the theory and practical work should, as much as possible, be integrated. Practical exercises especially those in professional courses and laboratory work should, as much as possible, be integrated to a ratio of 70:30.

CURRICULUM TABLES FOR NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY

NDI **SEMESTER ONE**

COURSE CODE	COURSE TITLE	L	P	CU/CH	TOTAL HOURS/ SEM
VLT 111	Introduction to Veterinary Laboratory Technology	1	0	1	15

VLT 112	Laboratory Animal Studies	1	2	3	45
VLT 113	Veterinary Medical Terminology	1	0	1	15
VLT 114	Animal Handling and WelfareI	2	2	4	60
VLB 111	Biology (Morphology and Physiology of Living Organisms)	2	3	5	75
VLC 111	Inorganic Chemistry	1	2	3	45
VLP 111	Mechanics and Properties of Matter	2	3	5	75
GNS 101	Use of English	2	0	2	30
GNS 111	Citizenship Education I	2	0	2	30
		12	9	21	390

NDI **SEMESTER TWO**

COURSE CODE	COURSE TITLE	L	P	CU/CH	TOTAL HOURS /SEM
VLT 121	Introduction to Animal Diseases	1	1	2	30
VLT 122	Veterinary Medicinal Products & Drug Use	1	1	2	30
VLT 123	Animal Anatomy and Physiology	2	2	4	60
VLT 124	Veterinary Laboratory Procedures I (Instrumentation)	1	2	3	45
VLT 125	Animal Handling and Welfare II	1	2	3	45
VBC121	Introductory Biochemistry	1	2	3	45
EeD 126	Introduction to Entrepreneurship	1	2	3	45
GNS 102	Communication in English	2	0	2	30
GNS 121	Citizenship Education II	2	0	2	30
VLC 121	Organic Chemistry	1	2	3	45
VLP 121	Optics, Waves and Sound, Electromagnetic Radiation	1	2	3	45
					435

ND II **SEMESTER ONE**

COURSE CODE	COURSE TITLE	L	P	CU/CH	TOTAL HOURS /SEM
VLT 211	Introductory Veterinary Pathology	2	2	4	60
VLT 212	Introduction to Veterinary Microbiology	2	2	4	60
VLT 213	Introduction to Veterinary Surgery	2	2	4	60
VLT 214	Veterinary Nursing	1	2	3	45

VLT 215	Veterinary Laboratory Procedures II (Care and Maintenance of Equipment)	2	2	4	60
VLT 216	Oral/Interpersonal Communication	1	0	1	15
VLT 217	Rural Sociology	1	0	1	15
VLT 218	Research Methodology (Bio Statistics)	2	0	2	30
					345

ND II **SEMESTER TWO**

COURSE CODE	COURSE TITLE	L	P	CU/CH	TOTAL HOURS /SEM
VLT 221	Record Keeping and Data Management	1	0	1	15
VLT 222	Seminar	0	1	1	15
VLT 223	Project	0	3	3	45
VLT 224	Clinical Posting	0	36	36	360 (10wks)
					435

ND I

FIRST SEMESTER

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: INTRODUCTION TO VETERINARY LABORATORY TECHNOLOGY				
COURSE CODE: VLT 111				
DURATION	**Lecture:- 1hours**	**Tutorial:- 0**Hours	**Practical:- 0** hours	**Total:- 1hr/wk(15hr/wk)**
CREDIT UNITS: 1				
GOAL: This course is designed to enable students acquire rudimentary knowledge in 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 2.0 Understand common terminologies in veterinary laboratory technology				

3.0 Know the roles of veterinary laboratory technologist in veterinary services

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY

COURSE TITLE: INTRODUCTION TO VETERINARY LABORATORY TECHNOLOGY	Course Code: VLT 111	Contact Hours: :- 1hr/wk(15hr/wk)
COURSE SPECIFICATION: Theoretical content	**Practical Content:**	

General Objective: 1.0: Know the history of veterinary laboratory technology

Specific Learning Objectives:	Teachers Activities	Learning Resources	Specific Learning Objectives:	Teachers Activities	Learning Resources	Evaluation
1.1 Define veterinary laboratory technology 1.2 Explain the history of veterinary laboratory technology 1.3 Explain the current status of veterinary laboratory technology	Explain what veterinary laboratory technology is	Books, journals, periodicals, internet, power point.				Ask questions Class assessment Test Assignment

General Objective: 2.0: Understand common terminologies used in veterinary laboratory technology

Specific Learning Objectives:	Teachers Activities	Learning Resources	Specific Learning Objectives:	Teachers Activities	Learning Resources	Evaluation
2.1 List relevant terminologies used in veterinary laboratory technology 2.2 Explain each terminology listed						Examination Quiz Assignment Test

General Objective: 3.0 Know the role of veterinary laboratory technology in Veterinary services.

Specific Learning Objectives:	Teachers Activities	Learning Resources	Specific Learning Objectives:	Teachers Activities	Learning Resources	Evaluation
3.1 Explain the sequence of arrangement of	Give examples to students.	Textbooks, journals, manuals				Test

equipment in the Laboratory. 3.2 Outline how consumables in the laboratory are taken and updated on routine basis. 3.3 Explain how to document samples examined on daily basis.	Explain how consumables in the laboratory are taken.					Report writing

PROGRAMME: NDVETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: LABORATORY ANIMAL STUDIES				
COURSE CODE: VLT 112				
DURATION	**Lecture:- 1 hr**	**Tutorial:-** Hours	**Practical:- 2**hours	**Total:- 3Hrs/Wk(45 hours/semester)**
CREDIT UNITS: 3 CU				
GOAL: This course is designed to train students to acquire knowledge of managing laboratory animals				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Understand the concept of the use of animals in the laboratory

2.0 Know common animals that are used in the laboratory

3.0 Know how to manage common laboratory animals

4.0 Know common signs of distress and disease in laboratory animals

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: LABORATORY ANIMAL STUDIES		**Course Code: VLT 112**		**Contact Hours: 3 hours/week**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Understand the concept of the use of Animals in the Laboratory						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Explain Laboratory Animals 1.2 Outline the brief history of the use/study of Animals in the laboratory 1.3 State the rationale for use of laboratory animals 1.4 State the current trends in the use of Laboratory Animals	Define Laboratory Animals to students Explain the history of Laboratory animals Explain to students rationale for use of animals in the laboratory. Explain new trends including challenges in the use of laboratory animals	Text books Journals Pictures Internet				Tests Assignment Examination Quizzes

General Objective: 2.0 Know common Animals that are used in the Laboratory						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 List the species and breeds of common Laboratory Animals 2.2 Describe the features of the various animals 2.3 Differentiate between the different breeds	Explain to students different species and breeds of animals used in the Laboratory Explain the distinguishing features of various laboratory animals and their breeds	Text books Journals Pictures Internet	Identify various laboratory animals and their breeds	Guide students to identify various laboratory animals and their breeds.		Practical Note books
General Objective: 3.0 Know how to manage common Laboratory Animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain how to manage common Laboratory Animals with emphasis on: -Housing -Feeding -Watering - Breeding 3.2 List equipment required for management of common Laboratory Animals	Lecture students on how to manage Laboratory Animals with emphasis on housing, feeding and watering and breeding Describe to students various housing, feeding	Text books Journals Pictures Internet	3.1 carryout: -Feeding -Housing -Watering of different Laboratory Animals	Guide students on how to feed, house and water different laboratory animals	Laboratory animals facilities	-Quiz -Test -Assignment -Practical Examination

	and watering utensils for laboratory animals					
General Objective: 4.0 Know common signs of Distress and Disease in Laboratory Animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Explain signs of distress in Laboratory Animals 4.2 Outline sources of distress in Laboratory Animals -Heat (weather) -injury -Diseases -Attack by predators -Improper handling etc 4.3 Outline basic steps to be taken to alleviate distress in Laboratory animals	Define Distress Explain the various sources of distress to animals Explain to students steps to be taken to alleviate stress in Laboratory Animals	Text books Journals Pictures Internet				Quiz -Test -Assignment -Practical Examination

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: VETERINARY MEDICAL TERMINOLOGY				
COURSE CODE: VLT 113				
DURATION	**Lecture:-** 15 hrs	**Tutorial:-** Hours	**Practical:-** hours	**Total:-** 15 hrs/Semester
CREDIT UNITS: 1				
GOAL: This course is designed to acquaint the students with terminologies used in the laboratory				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Appreciate the compound nature of the terminologies				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: VETERINARY MEDICAL TERMINOLOGY		**Course Code:** VLT 113		**Contact Hours:**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective 1.0: Appreciate the compound nature of the terminologies						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Identify the terminology cystoscopy 1.2 Break up the word into component parts – cysto - Scopy 1.3 Define each component - Cysto - Scopy - Bladder - View 1.4 Give the meaning of terminology – View the bladder	Motivate the students to pick on any terminology for break down	Medical dictionary Medical journals Medical Text books Power point				Continuous Assessment End of semester tests

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: ANIMAL HANDLING AND WELFARE I				
COURSE CODE: VLT 114				
DURATION	**Lecture:-** 2 hrs	**Tutorial:-** Hours	**Practical:-** 2hrs	**Total:-** 60 hrs/Semester
CREDIT UNITS: 4				
GOAL: This course is designed to expose students to safe handling and restraint of animals				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Know how to safely handle, restraint common laboratory, companion and food animals 2.0 Know how to provide core to common laboratory, companion and food animals and identify when they stressed 3.0 Know the health care needs of common laboratory, companion and food animals and risk involved during interaction with them 4.0 Know how to undertake safety transportation within and outside the laboratory/hospital environment and home slaughter of the food animals				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ANIMAL HANDLING AND WELFARE I		**Course Code:** VLT 114		**Contact Hours:**60 hrs/Semester		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective1.0: Know how to safely handle, restraint common laboratory, companion and food animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Explain how common laboratory, companion and food animals are handled and restrained 1.2 Outline basic equipment and facilities for restrain and handling of laboratory	Explain how common laboratory, companion and food animals are handled and restrained List basic equipment and facilities used for handling and restrain	Text books Journals Pictures Internet	Handle and restrain all species of animals among laboratory companion and food animals Display all equipment and facilities used in restrain and handling Display better housing feeding and watering	Show and demonstrate to students how animal should be handled and restrained Demonstrate/guide how all equipment and facilities for restraint and handling are used		
General Objective 2.0:Know how to provide core to common laboratory, companion and food animals and identify when they stressed						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Discuss how laboratory, companion and feed animals are catered for with all available	Explain to students how animals should be kept homely	Text books Journals Pictures	Describe the pain, fear, discomfort in animal	Take students to demonstration farms and identify the idle condition and the …….. for	Manuals User guide Demos	Assignment Test, Quizzes, Examination

requirements (housing, feeding watering) 2.2 Explain how stress, fear, pain and discomfort can be identified in companion, laboratory and food animals 2.3 Discuss how to alleviate, control or improve on conditions in 2.2 above	Describe to students how to identify fear, stress pain and discomfort in animals Explain to student how to alleviate or improve on conditions mentioned above.	Internet	Describe how pain, stress, discomfort is managed	better understanding of the environment Reproduce pain, fear, discomfort and stress in available animals for student to understand Revert pain fear, discomfort and stress by improving the situation	Text books Farms Kernels Ranches	(theory and practicals) Assignment Test, Quizzes, Examination (theory and practicals)
General Objective 3.0:Know the health care needs of common laboratory, companion and food animals and risk involved during interaction with them						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain basic health care needs of laboratory, companion and food animals 3.2 Describe the risks involved during interaction with laboratory, companion and food animals 3.3 List basic first aid facilities precautionary measures for emergency situations in handling and restrain	Describe to students basic health care needs Indicate to students dangers involved during interaction with animals Describe to students first aid measures precautions and its components	Text books Journals Pictures Internets	Describe basic health care needs Describe how to appraise animals Describe the use of first aid and precautionary measures	Show how basic health care needs are provided Show students direction to approach or how to handle animals Show students all first aid facilities and precautionary measures available and how to apply	Farms Stables Kernels	Assignment Test, Quizzes, Examination (theory and practicals)
General Objective 4.0:Know how to undertake safety transportation within and outside the laboratory/hospital environment and home slaughter of the food animals						

Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Discuss how to undertake transportation within and outside the laboratory/hospital environment 4.2 Explain humane slaughter of food animals and mercy killing where necessary	Describe how animals can be safely moved from one place to another Define human slaughter and mercy killing and how it is done	Text books Journals Pictures Internet	Demonstrate how animals can be transported effectively and safely Demonstrate how humane slaughter and mercy killing is being done	Show to students how to transport animals safely. Show how food animals are slaughtered and how mercy killing is being done	Loading-Bay Lairage Slaughter - slabs Abattoirs farms text books, Journals Pictures internet	Assignment Test, Quizzes, Examination (theory and practicals)

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: INORGANIC CHEMISTRY				
COURSE CODE: VLC 111				
DURATION	**Lecture:- 1Hour**	**Tutorial:-**	**Practical:- 2 Hours**	**Total:- 3 Hrs/wk(45Hrs/sem)**
CREDIT UNITS: 3				
GOAL: This course is designed to enable the students acquire knowledge of the basics of inorganic chemistry				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Understand atoms, molecules, composition and structure

2.0 Understand mole concept and Stoichiometry in Chemical Reactions

3.0 Understand Periodicity and Chemical Bonding

4.0 Understand the Chemistry of elements in groups I, II, VII and Transition metals

5.0 Understand the concept of Acids, Bases and Salts

PROGRAMME: ND VERTERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INORGANIC CHEMISTRY		**Course Code: VLC 111**		**Contact Hours:3Hrs/wk (45hrs/sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0 Understand Atoms, Molecules ant their Structures						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Outline the history of atomic and molecular theories. 1.2 Explain the atomic model based on works of Faraday, Thompson, Millikan, Rutherfords and Moseley. 1.3 Explain the experimental basis of atomic theory using the Bohr's theory of hydrogen atom and many electron atoms. 1.4 Describe the determination of relative atomic and molecular masses. 1.5 Explain isotopes and their uses	Lecture	Relevant textbooks, Journals, Internet, Classroom space etc	View the visible emission spectra of several metals in some of their compounds Interpret the mass spectrum of representative elements such as Oxygen, Carbon, Chlorine etc.	Guide and supervise lab technicians, technologists and students	direct vision spectroscope Bunsen burner, nichrome wire fixed to a cork handle, concHCl, solid chlorides of : barium, calcium, potassium, sodium and strontium beakers and watch glasses	Tests, classwork, assignment, etc

General Objective: 2.0 Understand Mole Concept and Stoichiometry in Chemical Reactions						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Be able to define the Mole 2.2 Describe molar mass 2.3 Interconversion of Moles, mass, and number of species 2.4 Calculation of mass percent from the chemical formula 2.5 Understand empirical formula 2.6 Understand molecular formula 2.7 Write and Balance Chemical Equations 2.8 Be able to write balanced chemical equations and to balance chemical equations. 2.9 Be able to express concentration in terms of molarity 2.10 Be able to perform inter-conversions of Mole-mass number for species in solution	Definition, illustrations Illustrations Calculates	Classroom space, relevant textbooks, journals, internet etc	Determine the formula of a compound from experimental data Be able to prepare a standardized solution of NaOH or HCl	Guide students	NaOH crystals, Volumetric Apparatus etc	Conduction of tests, assignments

2.11 Be able to use stoichiometry of chemical reactions in solution						
Objective: 3.0 Understand Periodicity and Chemical Bonding						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 State the different main energy levels of an atom, namely K, L. M… 3.2 Explain Quantum Numbers 3.3 Correlate the energies of the electron in the K,L,M,N,…shells with the values of the principal quantum no n= 1,2,3,4,…… 3.4 State Hund's rule, Pauli exclusion Principle, Auf-Bau principle and Heisenberg Uncertainty principle 3.5 Explain 3.4 above in relation to the concept of orbitals including subsidiary energy (s,p,d, f orbitals) 3.6 Explain the significance of the four quantum numbers	Lecture	Classroom resources Classroom resources	View the visible emission spectra of several metals in some of their compounds Interpret the mass spectrum of representative elements such as Oxygen, Carbon, Chlorine etc.	Guide and supervise lab technicians, technologists and students ,,	Laboratory space and apparatus ,,	Tests, Classwork, assignments, etc ,,

3.7 Place elements in the Periodic table into groups and Periods 3.8 Describe the shapes of s and p orbitals 3.9 Explain Electronic Configuration within groups 3.10 Write the electronic configuration for the first twenty elements 3.11 Relate electronic configuration to the position of elements in the periodic table. 3.12 Describe trends in the Periodic table such as Atomic size, Ionization energy, Electron Affinity, Reactivity etc 3.13 Explain Valency and Chemical Bonding 3.14 Explain the Octet and Duplet rules 3.15 Explain and Distinguish between the following types of bonds: Ionic, covalent,			Prepare iron sulphide from iron and sulphur	,,	,,	,,

metallic, coordinate covalent bonds 3.16 Understand the formation of the types of bonds in 3.15 above 3.17 Explain hybridization of atomic orbitals (sp^3, sp^2, spetc)						
General Objective: 4.0 Understand the Chemistry of Elements in Groups I, II, VII and Transition Metals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 List the elements in group I 4.2 Describe the occurrence of Group I elements in nature 4.3 Describe the physical and chemical Properties of group I elements 4.4 Repeat 4.1, 4.2 and 4.3 above to elements in group II, and VII respectively 4.5 Compare the acid strengths of the first four halogens 4.6 Explain the meaning of a Transition metal 4.7 Write the electronic configuration of transition metals of given atomic number	Lectures by illustrations, enumerating Lecture and explain transition metals. Relate their properties to	Classroom resources, relevant textbooks, Periodic table, internet, etc	Investigate the reactivity of group 2 metals (i) Mg. Ca, Sr, and Ba with water (ii) Mg and Ca with dilute HCl Reactivity of transition metals Obtain a UV spectrum of a	Guide and supervise lab technicians, technologists and students ,,	Mg, Ca, Sr, Ba, water, dilute hydrochloric acid test tubes etc, and laboratory space	Tests, Classwork, assignments, etc ,,

4.8 Explain the characteristic properties of the transition metals viz: i. Metallic Character ii. Variable Oxidation States iii. Complex ion formation iv. formation of coloured ions v. Paramagnetism 4.9 Relate the characteristic properties of the transition elements above to (a) electronic configuration. (b) Atomic and ionic radio (c) Ionization energies (d) Lattice energies and bond energies (e) Availability of vacant orbital for complex formation	electronic configuration, ionization energies, bond energies etc		range of coloured transition metal complexes and determine the wavelength of maximum absorbance. Add Cobalt (ii) chloride to water and obtain UV spectrum. Relate colour to absorption	,,		,,
General Objective: 5.0 Understand the Concepts of Acids, Bases and Salts						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Define an acid and a base according to Arrhenius, Bronsted – Lowry and Lewis concepts. 5.2 Identify acids and bases in chemistry equations. 5.3 Explain the meaning of the terms conjugates acid and conjugate base 5.4 Distinguish between a strong and weak acid or	Define acid, bases and salts and teach to identify them in equations	pH meter, conductivity meter, litmus strips etc	Carry out acid base titration by using conductance meter Determination of pH of	Guide and supervise lab technicians, technologists and students	Laboratory space and apparatus	Tests, classwork, assignments, practical reports.

base. 5.5 Write the expression for the dissociation constant for an acid HA (aq) 5.6 Give the equation for the degree of dissociation and concentration, M. (mole dm3) for a dilute solution of a weak acid. 5.7 Explain Ostwald's Dilution law and dissociation constant, K. 5.8 Calculate the degree of dissociation of a weak acid given the molarity and dissociation constant. 5.9 State the value of the ionic product of water. 5.10 Explain the concept of hydrogen on concentration and pH 5.11 Calculate the pH value of an acid or base given the hydrogen ion concentration 5.12 Identify various types of indicators and the use in the measurement of pH.	Explain dissociation constant and derive expression for it Work out simple calculations on degree of dissociation of weak acid	Identify indicators and use indicators in acid base titration	different solutions by using the different types of methods Measure the pH of solutions by using colour charts, indicators and pH meter Determine experimentally the strengths of acids and bases in relation to structure e.g. in the series CH3COOH, HCL, NH4, OH, NaOH	Guide and supervise lab technicians, technologists and students	,,	,,

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: MECHANICS AND PROPERTIES OF MATTER AND HEAT ENERGY				
COURSE CODE: VLP 111				
DURATION	**Lecture:- 2 Hours**	**Tutorial:-**	**Practical:- 3** hours	**Total:- 5Hrs/Wk(75hrs/Sem)**
CREDIT UNITS: 5 CU				
GOAL: This course is designed to develop the students understanding and applications of basic concepts in mechanics and properties of matter and heat energy.				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1. Understand the various fundamental and derived units.
2. Understand vectors and scalars and their application.
3. Understand the laws of motion.
4. Understand the basic concept of motion.
5. Understand the concept of work, energy and power.
6. Understand frictional forces and their effects.
7. Know the conditions for equilibrium of a stationary body under the action of coplanar forces.
8. Understand the principles of simple machines and their uses.
9. Understand circular motion.
10. Understand the behaviour of fluids at rest.
11. Understand the phenomenon of surface tension in liquids.
12. Understand the concept of elasticity

13. Understand the concept of viscosity
14. Understand the concept of temperature and its measurement
15. Understand the phenomenon of expansion and its effects
16. Understand the concept of heat as a form of energy
17. Understand the three states of matter and change of state
18. Understand the behaviour of gases in terms of atomic or molecular motions
19. Understand the modes of heat transfer.

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: MECHANICS AND PROPERTIES OF MATTER AND HEAT ENERGY		**Course Code: VLP 111**		**Contact Hours:5Hrs/Wk(75hrs/Sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0 Understand the various fundamental and derived units						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Identify the fundamental and derived quantities e.g. mass, length, time, temperature and charge. 1.2 List the S.I. units in which (1.1) quantities are measured. 1.3 State the dimensions of (1.1) above 1.4 Derived the dimensions some quantities in terms of fundamental quantities. 1.5 State the merits and demerits of dimensional analysis 1.6 Identify dimensionless quantities 1.7 Explain the use of measuring devices or apparatus; and their limitations e.g micrometer	Give examples and show the relation between them Check physical laws, equations using dimensional analysis. Measure small distances using micrometer screw guage and Vernier callipers.		To know how measure length,areas, volume of regular and irregular objects		Meter rule, Vernier calipers, micrometer screw gauge	

screw guage and vernier calipers, measuring cylinder, metre rule						
General Objective:2.0 Understand vectors and scalars and their application.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Define vector and scalar quantities. 2.2 List vector and scalar quantities 2.3 Define unit vectors, I j and k 2.4 Represent vectors in terms of unit vectors A= xi + yj +zk 2.5 Define dot and cross product of two vectors. 2.6 Resolve a vector into rectangular components. 2.7 Define resultant and equilibrium force 2.8 State the law of parallelogram of forces 2.9 Explain the resultant between vectors A and B 2.10 Define relative velocity	Illustrate with examples Solve numerical problem using expressions in 2.5 Express 2.5 in terms of unit vectors Solve numerical problems in 2,6 and 2.7 Solve numerical problems to calculate resultant and equilibrium forces/vectors acting from a point using 2.8		Determine experimentally the use of force board to calculate resultant and equilibrium of two or more vectors (force) Demonstrate experimentally the parallelogram law of forces			

	solve numerical problems in 2.9 and calculate the magnitude calculate the relative velocities of two cars moving at a particular speed in i) opposite direction ii) the same direction					
General Objective:3.0 Understand the laws of motion.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Define motion 3.2 List various types of motion. 3.3 Define distance and displacement. 3.4 Define speed, velocity and acceleration (instantaneous, uniform average). 3.5 Distinguish between: i) Distance and displacement ii) Speed velocity	Illustrate with examples Sketch graphs to illustrate the terms Solve numerical problems to calculate distance, time, velocity and					

iii) instantaneous and average velocities iv) instantaneous and average acceleration v) instantaneous and uniform velocities v) instantaneous and uniform acceleration 3.6 Derive the three equations of uniformly accelerated motion. 3.7 Draw the displacement-time and velocity- time graphs 3.7 Draw the displacement-time and velocity- time graphs 3.8 Define Projectile 3.9 List examples of projectile and areas of their applications. 3.10 Derive the equations of projectile in one and two dimensions.	acceleration in 3.6 and 3.7 Solve numerical problems to calculate time of flight, time to flight, maximum height and range					
General Objective:4.0 Understand the basic concept of motion.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Explain the concept of mass and inertia. 4.2 State Newton's first law. 4.3 Define momentum and impulse . 4.4 State S.I units of 4.3 4.5 State Newton's second law	Illustrate with examples Illustrate with examples Illustrate with examples, the	Trolley loaded with mass				

4.6 Relate Newton second law and changes in momentum. 4.7 Deduce F = ma from the second law 4.8 State the S.I unit of force and define 1N 4.9 Distinguish between mass and weight. 4.10 State Newton's third law. 4.11 State the law of conservation of linear momentum. 4.12 Derive equations 4.10 and 4.11. 4.13 Distinguish between elastic and inelastic collision. 4.14 Define coefficient of restitution.	relation mass and weight Illustrate with a senerio where Newton three laws are applicable. Solve numerical problems Illustrate with examples Calculate the final momentum: velocities of bodies in Elastic and in elastic collisions.					
General Objective: 5.0 Understand the concept of work, energy and power.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Define work, (F.S), energy and power (F.V) 5.2 State the S.I units in (5.1)	Solve numerical problems using area under					

5.3 Relate work done to changes in kinetic and potential energies. 5.4 Identify other forms of energy. 5.5 State the law of conservation of energy. 5.6 Explain conversion and conservation of all forms of energy. 5.7 Derive an expression for the kinetic energy of moving object and potential energy of object by reasoning of position. 5.8 Explain what is meant by conservation of a system of particles not acted by an external force 5.9 List the power ratings of machines and appliances	force-displacement graph Illustrate the law of conservation of energy to freely falling bodies and perfectly elastic collisions.					

General Objective: 6.0 Understand frictional forces and their effects.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Derive friction 6.2 State advantages and disadvantages of friction 6.3 State the laws of static friction. 6.4 State ways of reducing friction between two solid surfaces in relative motion 6.5 Distinguish between static and dynamic friction 6.6 List the applications in practical situation	Illustrate with diagrams and examples Solve problems on velocities of solid bodies moving in horizontal and inclined planes where friction is not negligible		Determine experimentally the coefficient of friction and verification of laws of friction		Inclined planed, rectangular object, masses, scale pan and thread	
General Objective:7.0 Know the conditions for equilibrium of a stationary body under the action of coplanar forces.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
7.1 Define moment of a force (torque) about a point and couple.	Illustrate with diagrams and solve	Metre rule, knife edge, masses, solid cone, bottle e.t.c	Determine experimentally C.G of		Force board, weight, plane	

7.2. Define centre of gravity (C.G)of a body. 7.3 Explain and distinguish the terms; stable, unstable and neutral equilibrium 7.4. State the conditions necessary for stable equilibrium 7.5 State the principles of triangle of forces and Lami's theorem 7.6 State the necessary conditions for a system to be in equilibrium under the action of three non-parallel forces. 7.7 Define sensitivity of a beam balance. 7.8 State the law of triangle forces	numerical problem in 7.1 Solve problem on centre of gravity of composite bodies Solve numerical problems to calculate equilibrium positions of various shapes; square, circle, rectangle e.t.c with given dimensions	Beam balance,massese.t.c is used to apply equilibrium forces calculate unknown mass using pivoted meter rule	irregular shaped objects Determine experimentally the law 7.8		paper and thread	
General Objective:8.0 Understand the principles of simple machines and their uses.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
8.1Explain the concept of simple machines 8.2 List examples of simple machines 8.3 Define effort E, load L, mechanical advantages M.A. velocity ratio V.R and the efficiency of a machine.	Solve numerical problems to calculate; E,L,M.A,V.R and efficiency	Wheel barrow, bottle opener, scissors pliers e.t.c				

8.4Derive expression that connect effort E, load L, mechanical advantages M.A. velocity ratio V.R and the efficiency of a machine. 8.5 Explain why efficiency is not hundred percent.						
General Objective:9.0 Understand circular motion.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
9.1 Define the terms angular displacement; angular velocity, angular acceleration, tangential velocity and radial acceleration. 9.2 Derive expressions for angular velocity and angular acceleration. 9.3 Differentiate between: i) Linear displacement and angular displacement ii) Linear velocity and angular velocity iii) Linear acceleration and angular acceleration iv) Radial acceleration and tangential acceleration. 94 Define centripetal and centrifugal forces.	Illustrate with diagrams Calculate the distance travelled and velocities of bodies in horizontal and circular motion. Solve numerical problems involving banked tracks.		Demonstrate circular motion in both horizontal and vertical circles using a stone tied to a string.			

9.5 Explain how centrifuge works 9.6 List examples of bodies performing circular motion. 9.7 Explain the reason for banking of roads .						

General Objective:10.0 Understand the behaviour of fluids at rest.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
10.1 Define density and relative density of fluids 10.2 Derive an expression for the pressure exerted by a column of a fluid. 10.3 State Pascal's law of transmission of pressure in fluids 10.4 Explain the principles of hydraulic press. 10.5 State Archimedes" principles 10.6 State the law of floatation.	Calculate separately the following parameters for bodies partially or wholly immersed in a liquid by means of a string applying the law of floatation and for Archimedes principles: i) the tension of the string ii) volume of body immersed	Measure pressures using manometers and barometers	Describe manometers and barometers (simple aneroid and for tin barometers) Verify experimentally the principle in 10.4 above Measure relative density of a liquid by applying the principles			

	iii) specific gravity of the body iv) relative density of the liquid		mentioned in 10.5 above. Measure relative density using hydrometers. Measure the relative density of a liquid using a U-table.			
General Objective:11.0 Understand the phenomenon of surface tension in liquids.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
11.1 Explain the phenomenon of surface tension. 11.2 Define and state unit of surface tension. 11.3 Explain surface tension in terms of molecular interactions. 11.4 State methods of reducing surface tension 11.5 List effects of surface tension 11,6 State applications of surface tension 11.7 Define angle of contact 11.8 Explain capillary qualitatively	Illustrate with diagram Solve simple problem on surface tension Illustrate with diagram					

11.9 List various applications of capillarity. 11.10 Explain the effect of temperature on surface tension.						

General Objective:12.0 Understand the concept of elasticity						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
12.1 Explain elasticity 12.2 Define stress and strain 12.3 State Hooke's law 12.5 Determine the elastic constant of a spring 12.6 Draw and explain the load extension curve and indicate elastic limit. 12.7 Define young's modulus. 12.8 Derive the expression for the energy stored in an elastic spring or string,	Spiral springs, masses Solve numerical problems involving Hooke, area under force-extension graph e.t.c		Determine experimentally the law in 12.3 and elastic constant of a spring			
General Objective:13.0 Understand the concept of viscosity						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
13.1 Explain viscosity						

13.2 Compare viscosity with solid friction 13.3 Define the coefficient of viscosity 13.4 Explain the motion of a ball bearing falling through a viscous fluid. 13.5 Define terminal velocity 13.6 List applications of viscosity	Solve simple problem on viscosity		Determine experimentally coefficient of viscosity, terminal velocity			
General Objective:14.0 Understand the concept of temperature and its measurement						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
14.1 Define temperature using concept of thermal equilibrium 14.2 Define temperature in terms of thermometric properties, length of liquid column, pressure of a gas under constant pressure, resistance of a wire, e.m.f. of thermocouple, I radiation from a hot body. 14.3 Define temperature scales (Celsius scale, kelvin scale, ideal gas scale). 14.4 Convert Celsius to Kelvin scale. 14.5 Compare the Ideal gas scales and other scales	Thermometer Solve numerical problems on different scales of temperature and their conversion					

14.6 List the basic seven fixed points on the international temperature scales. 14.7 Identify the different types of thermometers: i) Liquid in glass thermometers (choice of appropriate liquid) li) Resistance thermometer Iii) Thermocouple. iv) Pyrometers v) Gas thermometer vi) Clinical thermometers vii) Minimum and maximum thermometers 14.8 Describe the appropriate uses of thermometers 14.9 List the limitations of various types of thermometers 14.10 Construct and calibrate a liquid in glass thermometer and resistance thermometers 14.11 Convert temperature from Fahrenheit scale to Celsius and thermodynamic scales and vice visa using the appropriate formula.						
General Objective:15.0 Understand the phenomenon of expansion and its effects						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

15.1 Explain the effect of heat on solids, liquids and gases 15.2 Define linear, superficial and cubical expansivities 15.3 State the relationship between the expansivities 15.4 Distinguish between real and apparent expansion of liquids.	Calculate the increase in volume, length and area expansion of solids, liquids using correct formulae are new length, area and volume in expansivity, superficial expansivity cubical expansivity temperature change		Determine experimentally linear expansivity of solid in the form of a rod Determine experimentally the cubical expansivity of a liquid using a specific gravity bottle.			
General Objective:16.0 Understand the concept of heat as a form of energy						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
16.1 Define heat energy 16.2 Distinguish between heat energy and temperature 16.3 Define heat capacity and specific heat capacity 16.4 State Newton's laws of cooling. 16.5 Explain cooling corrections in measurements of quantity of heat			Determine specific heat capacity of solids and liquids experimentally. Verify Newton's law of cooling experimentally. Determine the specific heat			

16.6 Apply these corrections (16.5 above) in heat experiments 16.7 Calculate the heat capacity of different solids and liquids from experimental results.			capacity of liquids using Newton's law Newton's law of cooling.			
General Objective: 17.0 Understand the three states of matter and change of state						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
17.1 Define melting point and boiling point 17.2 Explain the effect of: i) pressure on boiling and freezing points ii) impurities on boiling point and freezing points 17.3 Explain latent heat of fusion and vapourisation.	Calculate the heat capacity, specific heat capacity and specific latent heat of fusion of solids given necessary data heat of fusion. Calculate the specific latent heat of vapourisation of liquids given necessary data Compare results above.		Determine experimentally melting point and boiling, point of various substances e.g. naphthalene Determine experimentally specific heat capacity substances Determine experimentally specific latent heat of fusion of ice. Determine experimentally specific latent			

			heat of vapourisation of and some other liquids			
General Objective:18.0 Understand the behaviour of gases in terms of atomic or molecular motions						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
18.1 Define atom, molecule, Avogadro constant, relative molecular mass, mole, molar mass, molar volume and S.T.P. 18.2 Differentiate between: i) number of moles, number of molecules and Avogadro's constant ii) number of moles, mass of the gas and molar volume 18.3 State the assumptions of the kinetic theory of gases. 18.4 Explain Brownian motion 18.5 Explain Maxwellian distribution of velocities (quantitatively). 18.6 Explain the most probable speed, the mean speed and the mean square speed 18.7 Derive the expression for the pressure exerted by an ideal gas.	Solve relevant numerical problems in 18.2- 18.11 Calculate the volume of gases.		Verify the gas laws experimentally			

18.8 Relate the kinetic energy of a gas to its temperature 18.9 Derive the equation of state of an ideal gas using the kinetic theory. 18.10 Deduce other gas laws from the equation of state e.g. Boyles law and Charles law. 18.11 Distinguish between real and ideal gas 18.12 Deduce van der waal's equation of state of real gas						
General Objective:19.0 Understand the modes of heat transfer.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
19.1 Explain the terms: Conduction, conversion and radiation of heat energy 19.2 Explain 19.1 above in terms of molecular theory 19.3 Define and give examples of good and bad conductors of heat energy 19.6 List some applications of heat transfer e.g. thermos flask, green house, land and sea breeze etc.			Demonstrate experimentally convection current in water Demonstrate experimentally that black bodies are better absorbers of radiation energy than polished or shiny surfaces.			

ND I

SECOND SEMESTER

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: INTRODUCTION TO ANIMAL DISEASES				
COURSE CODE: VLT 121				
DURATION	**Lecture:- 1 Hour**	**Tutorial:-**	**Practical:- 1 Hour**	**Total:- 2Hrs/wk (30Hrs/Wk)**
CREDIT UNITS: 2 CU				
GOAL: This course is designed to provide the students with basic knowledge of animal diseases				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Know the terminologies used in animal diseases

2.0 Know the major viral diseases of domestic and laboratory animals

3.0 Know the major bacteria diseases of domestic and laboratory animals

4.0 Know the major fungal diseases of animals

5.0 Know the animal protozoan and rickettsia diseases of economic importance in Nigeria.

6.0 Know the major reproductive problems of animals

7.0 Know animal helminths diseases of economic importance in Nigeria

8.0 Know animal disease control procedures

9.0 Know the common diseases of fish in Nigeria

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO ANIMAL DISEASES		**Course Code: VLT 121**		**Contact Hours:2Hrs/wk (30Hrs/Wk)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Know the terminologies used in animal diseases						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define common terms: (a) Disease (b) Health (c) Health Maintenance (d) Endemic (e) Sporadic (f) Disease control (g) Disease eradication (h) Infection (i) Diagnosis (j) Pathogensis 1.2 Explain certain factors that may predispose animals disease e.g. nutrients status, transportation stress, sex, traumatic injury, etc. 1.3 Classify the factors in 1.2. above into intrinsic and extrinsic 1.4 Explain the direct and indirect effect of	Define terminologies with examples Outline the factors in 1.2 Give examples of specific diseases Outline the direct and indirect effects of ill-health in 1.4	Animal Samples (Sick and Healthy) Pictures	1.1 Identify portals of disease entry in the body	Supervise the identification of portals of disease entry in the body	Animal samples Restraining rope	Assignments Tests Quizzes Examination

animal ill-health on the economy of farmers and the nations 1.5 List the clinical signs of diseased or sick animals e.g. anorexia, rough hair coat, emaciation, bilateral lacrimation, pale mucus membrane, etc.						
General Objective: 2.0: Know the major viral diseases of domestic and laboratory animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 List the major viral diseases of animals with their aetiologic agents 2.2 Describe the methods of transmission, clinical signs, management and control of viral diseases in 2.1 above 2.3 List some viral diseases with nervous involvement e.g. Rabies and describe their clinical signs 2.4 Identify viral diseases characterized by skin lesions and describe their aetiology, clinical signs and control 2.5 Identify some specific viral diseases of cattle e.g. rinderpest, humvy skin disease, foot and mouth disease and describe their clinical signs and control 2.6 List some specific viral diseases of sheep and goats	Describe the general nature of viral diseases including transmission, clinical signs, treatment and control Explain some viral diseases in 2.3 with nervous signs e.g. canine distemper and rabies Explain some viral diseases of sheep and goats	Animal Samples Syringes Needles Drenching gun Birds and vials of vaccine	2.1 Identify common viral diseases	Explain the clinical signs, control measures	Animal Samples Syringes Needles Drenching gun Birds and vials of vaccine	Assignments Tests Quizzes Examination

2.7 List some viral diseases of poultry						
General Objective: 3.0 Know the major bacteria diseases of domestic and laboratory animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 List the major bacteria diseases of animal indicating their aetiology 3.2 Describe the transmission, clinical signs, diagnosis treatment and control of the following major bacterial diseases of animals e.g. Anthrax, Haemorrhagicsepticaecus, black lag, Tetanus, Tuberculosis, Brucellosis, Collibacillosis, etc. 3.3 Identify the clinical signs of diseases in 3.2. above in animals 3.4 List and describe major bacterial diseases of swine e.g. swine dysentery, erysipelas, enzootic pneumonia, etc. 3.5 Identify clinical signs of diseases in 3.4 above in swine 3.6 List disease associated	Explain the major bacterial diseases of animals and their causes Discuss the mode of transmission, diagnosis, treatment and control of these diseases Explain mastitis types and their causes, treatment and prevention Explain the causes, mode of transmission, clinical signs, treatment and control of diseases in 3.7.	Animal Samples Syringes Needles Sample bottles, Diagnostic kit Microscope Milking cup Restraint rope Test tube	3.1 Identify common bacterial diseases	Explain the clinical signs, treatment and control measures	Animal Samples Syringes Needles Sample bottles, Diagnostic kit Microscope Milking cup Restraint rope Test tube	Assignments Tests Quizzes Examination

with Mycoplasma infections in animals 3.7 Describe the aetiology occurrence, clinical signs, diagnosis, treatment and control of: (i) Contagious bovine pleuropneumonia (CBPP) (ii) Contagious caprine pleuropneumonia (CCPP) (iii) Chronic respiratory diseases (CRD) of poultry 3.8 Identify clinical signs of CBPP, CCPP and CRD in animals						
General Objective: 4.0 Know the major fungal diseases of animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 List some of the common fungal diseases of domestic animals and their aetiology e.g. Aspergillosis, ringworms, etc. 4.2 Identify clinical signs of fungal infection on animals 4.3 Name some common antimycotic drugs e.g. Amphoterrain B, Nystatin, Escabiol, etc.	Explain the clinical signs of fungal infection on animals and some common antifungal drugs	Animal Samples Sample bottles, Diagnostic kit Microscope Petri dish Scapel blade	4.1 Identify common fungal diseases	Explain the clinical signs, treatment and control measures	Animal Samples Sample bottles, Diagnostic kit Microscope Petri dish Scapel blade	Assignments Tests Quizzes Examination
General Objective: 5.0 Know the animal protozoan and rickettsia diseases of economic importance in Nigeria						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

5.1 List animal protozoan diseases of economic importance in Nigeria. Trypanosomaisis, Babesiosis, Corodriosis etc. 5.2 Describe method of transmission, clinical sings, treatment and control. 5.3 Identify clinical signs of diseases in 5.1 above in animals. 5.4 Identify the organisms listed in 5.1 above.	Determine the economic importance of protozoan diseases in Nigeria. Determine clinical signs of diseases in 5.1 above.	Blood samples Test tube Microscopes Slides Pictures	5.1 Identify common protozoan and rickettsia diseases	Explain the clinical signs, treatment and control measures Help students to the identify common protozoan and rickettsia organisms in microscope	Blood samples Test tube Microscopes Slides Pictures	Assignments Tests Quizzes Examination
General Objective: 6.0 Know the major reproductive problems of animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Define infertility and sterility. 6.2 Describe types of infertility and their causes e.g Anestrus etc. 6.3 Describe reproductive diseases of animals in terms of causes and clinical signs e.g. I. Cystic ovarian complex II. Pseudo-pregnancy (false pregnancy) III. Phymosis and paraphymosis etc. 6.4 Explain enzootic abortions in farm animals,	Explain infertility types and causes Discuss enzootic abortion in farm animals and the economic importance	Vaginal speculum, Diagnostic kit, microscope, test tubes, Bulls and pregnant animals.	6.1 Identify with examples common reproductive diseases of animals	Show the students the pictures/ animals	Vaginal speculum, Diagnostic kit, microscope, test tubes, Bulls and pregnant animals.	Assignments Tests Quizzes Examination

their causes, clinical signs and economic importance.						
General Objective: 7.0 Know animal helminths diseases of economic importance in Nigeria						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
7.1 List animal helminth diseases of economic importance in Nigeria 7.2 Describe the life cycle, transmission, clinical signs, control, e.gcestodes, nematodes, trematodes etc	Lecture with pictures.	Faecal samples, microscopes	7.1 Identify and Classify various worms e.g. trematodes, cestodes and nematodes	Carry out practical demonstration of various worms/eggs e.g. trematodes, cestodes and nematodes	Model poster of the worms/eggs Charts Projectors	Assignments Tests Quizzes Examination
General Objective: 8.0 Know animal disease control procedures						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
8.1 List the general methods of animal disease control e.g – Vaccination e.g Rinderpest. – Test and slaughter methods e.g CBPP – Mass treatment and mass vaccination e.g FMD – Vector control e.gTrypanosomiasis – Quarantine e.g FMD – Reservoir control e.g Rabies	Describe the common methods of disease control in a named farm	Automatic syringes, Dewormers, Restraining rope, animal, etc.	8.1 Identify disease control procedures	Assist students in carrying out vaccination in some species of animals	Automatic syringes, Dewormers, Restraining rope, animal, etc.	Assignments Tests Quizzes Examination

– Isolation e.g Tuberculosis – Strategic Deworming e.g. Haemonclosis						
General Objective: 9.0 Know the common diseases of fish in Nigeria						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
9.1 List the viral diseases of fish and their causes, clinical signs and control 9.2 List the major bacterials and fungal diseases of fish, their agents, clinical signs, treatment and control	Explain the content in 9.1 to 9.2	Fish Pictures Microscope	9.1 Identify viral, bacterial, fungal, nutritional diseases of fish	Supervise the identification of diseased fish.	Fish Pictures Microscope	Assignments Tests Quizzes Examination

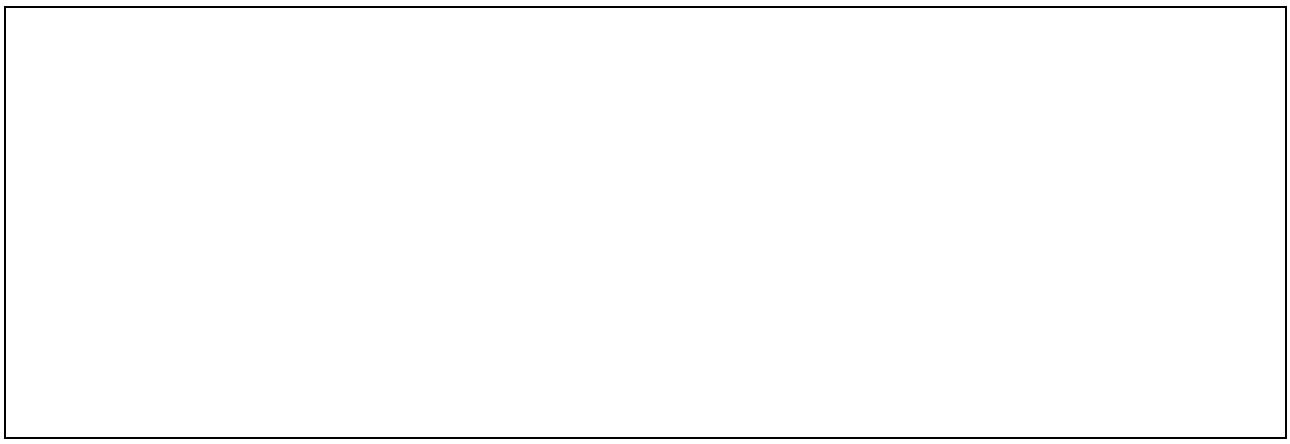
PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: VETERINARY MEDICINAL PRODUCTS AND DRUG USE(VMPS)				
COURSE CODE: VLT 122				
DURATION	**Lecture:- 1hr**	**Tutorial:- 0**	**Practical:- 1**hour	**Total:- 2hrs/wk (30hrs/sem)**
CREDIT UNITS: 2 CU				
GOAL: This course is designed to enable students acquire knowledge and skills in veterinary medical products/drugs and their uses.				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Know basic medicinal products used in veterinary laboratory practice. 2.0 Know the available dosage forms of medicinal products and drugs. 3.0 Know how to administer medicinal products and drugs to patients. 4.0 Know how to properly keep different veterinary medicinal products and drugs. 5.0 Know how to weigh veterinary medicinal products/drugs and their units of measurements.				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: VETERINARY MEDICINAL PRODUCTS AND DRUG USE(VMPS)		**Course Code: VLT122**		**Contact Hours: :- 2hrs/wk (30hrs/sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Know basic medicinal products used in veterinary laboratory practice.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define veterinary medicinal products 1.2 Identify the types of veterinary medicinal products 1.3 Explain origin of veterinary medicinal products	Define veterinary medicinal products Explain the various types of veterinary medicinal products Discuss the origin of various types of veterinary	Textbooks Journals Internet Pictorial chart	1.1 Show examples of veterinary medicinal products	Guide students to understand veterinary medicinal products	Practical guide manuals	Assignment Test Practical report Examination (theory and practical)

	medicinal products					
General Objective: 2.0: Know the available dosage forms of medicinal products and drugs.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Define drug dosage forms. 2.2 Outline the types of dosage forms	Define drug dosage forms. .	Textbooks Journals Internet Pictorial chart	2.1 Show various dosage forms. 2.2 Show equipment used in the delivery of various dosage forms.	Demonstrate different dosages forms to students	Practical guide Manuals	Assignment Test Practical reports Examination(theory and practical)
General Objective: 3.0 Know how to properly keep different veterinary medicinal products and drug use						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain how they are administered 3.2 Identify requirements used in delivery of veterinary medicinal products	Explain how various dosage forms are administered	Textbooks Journals Internet Pictorial chart	3.1 Demonstrate how they are administered	Identifying all the equipment used in delivery Use the equipment hands on	Practical Guide Manuals	Examination Quiz Assignment Practical Reports Test
General Objective: 4.0 Know how to properly keep different veterinary medicinal products and drugs						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

3.1 Explain how to properly and safely handle veterinary medicinal products 3.2 Explain how to store different veterinary medicinal products 3.3 List basic facilities used in storage of veterinary medicinal products	Explain how veterinary medicinal products are stored	Textbooks Journals Internet Pictorial chart	3.1 Identify facilities for storing drugs and how they are stored	Show students the facilities for storing veterinary medicinal products and how they are stored	Charts	Examination Quiz Assignment Practical Reports Test
General Objective: 5.0 Know how to weigh veterinary medicinal products/drugs and their units of measurements.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Describe different units of metric system 5.2 Identify the basic weighing equipment	Explain with examples various types of units	Textbooks Journals Internet Pictorial chart	5.1 Identify the basic weighing equipment 5.2 Demonstrate the use of the equipment	Show the students basic weighing equipment. Guide students on the use of basic weighing equipment.	Assignment Test Practical report Examination (theory and practical	Examination Quiz Assignment Test

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: ANIMAL ANATOMY AND PHYSIOLOGY				
COURSE CODE: VLT 123				
DURATION	**Lecture:- 2 Hours**	**Tutorial:-**	**Practical:- 2 Hours**	**Total:- 4Hrs/Wk(60Hrs/Sem)**
CREDIT UNITS: 4 CU				
GOAL: This course is designed to acquaint the students to normal anatomic and physiology of animals				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Understand anatomic structures of the bovine by systems – Head, eye, GIT, Skeletal, Genitalia, Muscular 2.0 Use Cadaveric dissection to identify various body organs by system 3.0 Know the vital parameters of all domestic animals 4.0 Use apparently healthy domestic animals to evaluate the normal range of vital parameters				



PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ANIMAL ANATOMY AND PHYSIOLOGY		**Course Code: VLT 123**		**Contact Hours:4Hrs/Wk(60Hrs/Sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Understand anatomic structures of the bovine by systems – Head, eye, GIT, Skeletal, Genitalia, Muscular						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Identify various anatomic organ body systems 1.2 Identify the normal organs "in-situ" in pictures	Explain the various body structures Show the normal organs in pictures	Drawings of Bovine Organs Textbooks Journals Power point				Assignments Tests Quizzes Examination Spot Test
General Objective: 2.0: Use Cadaveric dissection to identify various body organs by system						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
			2.1 Identify body cavities 2.2 Identify organs in each body cavity 2.3 Observe the relationship between the organs on the cadaver	Identify each organ	Bovine Cadaver	Assignments Tests Quizzes Examination
General Objective: 3.0 Know the vital parameters of all domestic animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

3.1 List the common vital parameters in domestic animals (Rectal Temperature, Respiratory rate and Pulse rate	Give Tables of the Parameter	Textbooks Journals Powerpoint				Assignments Tests Quizzes Examination
General Objective: 4.0 Use apparently healthy domestic animals to evaluate the normal range of vital parameters						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
			4.1 Use cow, goat, sheep, dog, cat, chicken to take pulse, respiration and temperature in animals.	Demonstrate how to take parameters	Life Animals	Assignments Tests Quizzes Examination

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: Veterinary Laboratory Procedure 1 (Instrument and Instrumentation)				
COURSE CODE: VLT 124				
DURATION	**Lecture:- 1Hour**	**Tutorial:-** Hours	**Practical:- 2** hours	**Total:- 3 Hours**
CREDIT UNITS: 3				
GOAL: This course is designed to enable the students acquire knowledge of the various laboratory procedures in the Veterinary Laboratory				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Know the major equipment and Instruments in a Veterinary Laboratory

2.0 Know the uses of the equipment/Instrument in a Veterinary Laboratory

3.0 Know the care and maintenance of the equipment and Instruments in a Veterinary Laboratory

PROGRAMME: NDVETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: Veterinary Laboratory Procedure 1 (Instrument and Instrumentation)		**Course Code:** VLT 124		**Contact Hours:hrs/Semester**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0 Know the major equipment and Instruments in a Veterinary Laboratory						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Outline the major equipment and Instruments in the Veterinary Laboratory 1.2 Identify the equipment and instruments mentioned in 1.1 above	Enumerate, list and describe	Classroom space, relevant charts etc	Identification of laboratory equipment	Guides students in the identification		
General Objective: 2.0 Know the uses of the equipment/Instrument in a Veterinary Laboratory						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Identify the different types of laboratory glass wares e.g. beakers test tube, funnels, flask etc. 2.2 State the uses of different laboratory wares	Lecture Practical identification and sketch/illustration in the laboratory Laboratory identification	Different glasswares in the laboratory	See column 1	See column 2	See column 2	

2.3 Outline the uses of other laboratory equipment and instrument	Gets students involved in the preparation and use of cleansing agents. Teacher to demonstrate cleaning of sintered glass ware using chromic water and organic advents. Lecture					
General Objective: 3.0 Know the care and maintenance of the equipment and Instruments in a Veterinary Laboratory						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Prepare cleaning reagents for laboratory wares. 3.2 Clean laboratory wares using cleansing agents	Gets students involved in the preparation and use of cleansing agents. Teacher to demonstrate cleaning of sintered glass ware using chromic water and organic advents.	Beakers, burette, pipette, test tube etc. Water fittings, gas fittings, light fittings Grease, kipps apparatus condensers Containers, H_2SO_4, alcohol etc. Used or dirty sintered glass wares;	Prepare different types of cleaning agents	See column 2	See column 3	
3.3 Know how to maintain laboratory sensitive equipment like balances, Microscope etc	Demonstrate cleaning of	Top loading balance,	cleaning of balances.			

	balances. Allow students to participate under strict supervision	Analytical balance, Standard masses	Allow students to participate under strict supervision	Allow students to participate under strict supervision	,,	

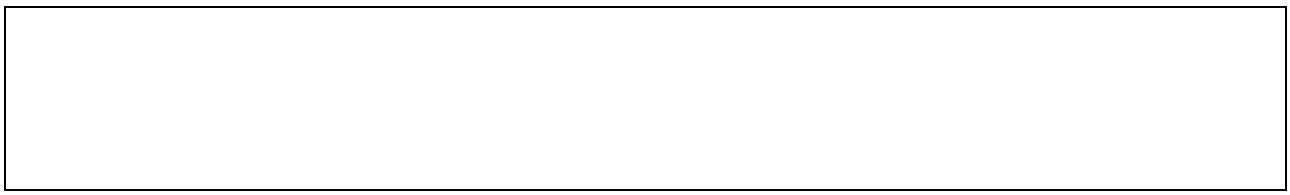
PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: ANIMAL HANDLING AND WELFARE II				
COURSE CODE: VLT 125				
DURATION	**Lecture:- 1 Hours**	**Tutorial:-**	**Practical:- 2 Hours**	**Total:- 3Hrs/Wk(45Hrs/Sem)**
CREDIT UNITS: 3 CU				
GOAL: This course is designed toexpose students to the handling and humane management of aquatic, exotic and wild animals				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Know how to handle and restrain some aquatic, exotic and wild animals

2.0 Know how to provide care to aquatic, exotic and wild animals and identify when they are stressed

3.0 Know the health care needs of aquatic, exotic and wild animals and risks involved during interactions

4.0 Know how exotic and wild animals are put to humane death



PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ANIMAL HANDLING AND WELFARE II		**Course Code: VLT 125**		**Contact Hours:3Hrs/Wk(45Hrs/Sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Know how to handle and restrain some aquatic, exotic and wild animals						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Explain how aquatic, exotic and some wild animals are handled and restrained 1.2 Outline the equipment and facilities that are used in restraining aquatic, exotic and wild animals	Explain how aquatic, exotic and some wild animals are handled and restrained Explain the equipment and facilities that are used in restraining aquatic, exotic and wild animals	Textbooks Journals Pictures Internet	1.1 Handle and restrain some selected aquatic and wild animals 1.2 Identify equipment and facilities used in restraining aquatic, exotic and wild animals 1.3 Demonstrate how to use restraint equipment	Show how to handle and restrain aquatic, exotic and wild animals Show students the various equipment and facilities used in restraining aquatic, exotic and wild animals Guide students on how to use restraint	Practical Manuals and note books, Animals Restraint equipment and facilities	Assignments Tests Quizzes Examination
General Objective: 2.0: Know how to provide care to aquatic, exotic and wild animals and identify when they are stressed						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Explain how aquatic, exotic and wild animals are	Explain how aquatic, exotic and	Textbooks Journals Pictures Internet	Demonstrate how to feed, water and house aquatic,	Guide students on how to feed, water and house	Zoo, Wildlife park	Assignments Tests

managed (housing, feeding, watering) 2.2 Outline the signs of fear, stress, pain and discomfort in aquatic, exotic and wild animals	wild animals are managed Explain to students how to recognize the signs of fear, stress, pain and discomfort in aquatic, exotic and wild animals		exotic and wild animals	aquatic, exotic and wild animals		Quizzes Examination
General Objective: 3.0 Know the health care needs of aquatic, exotic and wild animals and risks involved during interactions						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Outline some common diseases of aquatic, exotic and wild animals 3.2 List basic first aid facilities used in aquatic, exotic and wild animals 3.3 Outline some of the risk involved in handling aquatic, exotic and wild animals 3.4 List first aid requirement for handlers of aquatic, exotic and wild animals	Explain some common diseases of aquatic, exotic and wild animals Explain some basic first aid facilities used in aquatic, exotic and wild animals management Explain the risk involved in handling aquatic, exotic and wild animals Explain the basic first aid requirement for handlers of aquatic, exotic and wild animals					Assignments Tests Quizzes Examination

General Objective: 4.0 Know how exotic and wild animals are put to humane death						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 List options for puttingaquatic, exotic and wild animals to humane death	Explain basic forms of euthanasia					Assignments Tests Quizzes Examination

PROGRAMME:ND VETERINARY LABORATORY TECHNOLOGY				
COURSE:INTRODUCTORY BIOCHEMISTRY				
CODE:VBC 121				
DURATION	**Lecture: 1Hr**	**Tutorial:**	**Practical: - 2HRS**	**Total: 3Hrs/Wk(45Hrs/Wk)**
UNITS: 3 CU				
GOAL: This course is designed to enable students to acquire a basic knowledge of Life science chemistry				
GENERAL OBJECTIVES: On completion of this course, the student should be able to:				

1.0 Understand the molecular organization of the living cell

2.0 Understand the importance of water and the concepts of pH and buffers

3.0 Understand the properties, sources, uses and structure of carbohydrates

4.0 Understand nature, biological, and industrial importance of lipids

5.0 Understand the structure, properties, behavior and functions of proteins

6.0 Understand the classification of amino acids

7.0 Understand the structure and behavior of proteins

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTORY BIOCHEMISTRY		**Course Code: VBC121**		**Contact Hours: 3Hrs/Wk(45Hrs/Sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Understand the molecular organization of the living cell						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 List cell organelles 1.2 Explain centrifugation 1.3 Explain the structure, functions and fractions of intracellular organelles. 1.4 Describe chemical composition of the (i.e. carbohydrate, protein, lipids, DNA, RNA, nucleoproteins etc.)	Lectures On cell organelles	Internet Journals books	Centrifugation of fractions.	Demonstrate Practical on cell fractionation	Black Board Centrifuge Experimental animal Dissecting set Homogeniser Glasswares.	Assignments Tests Quizzes Examination
General Objective: 2.0: Understand the importance of water and the concepts of pH and buffers						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Explain the importance of water as a major Cellular component.	Lectures on water and the	Internet Journals books	Choose the Appropriate acid and its salts (base	Demonstrate the use of the pH metre.	Indicator papers pH metre	Assignments Tests

2.2 List the properties of water. 2.3 List the common laboratory and physiological buffer systems with their components. 2.4 Explain how the buffers above function to resist pH changes particularly in physiological systems.	importance of buffers		and its salt) for a buffer system at a given pH from a list of weak acids/bases.	Conduct practicalson the measurement of pH of solutions	Indicator solutions. Glassware's/Tiles	Quizzes Examination
General Objective 3.0: Understand the properties, sources, uses and structure of carbohydrates						

1 Explain carbohydrates as poly hydroxyl ketones or Poly hydroxylaldehydes and their derivatives. .2 List the general properties of carbohydrates. .3 Explain the general properties of carbohydrates. .4 List common sources of carbohydrates. .5 List domestic and industrial uses of carbohydrate s .6 Classify carbohydrates as mono-di- .7 Oligo and polysaccharides'. .8 Draw structural formula of named examples of the families in 3.6 above.	Lectures on the chemistry of carbohydrate Lectures on the importance of carbohydrate	Internet Journals books	Test for Carbohydrate in the laboratory by e.g. Fehling's etc.	Conduct Practical test for carbohydrates	GlasswaresReagents such as molish, Fehling's etc.	Test Assignment Quizzes Examinations

General Objective 4.0: Understand nature, biological, Medical and industrial importance of lipids						
4.1 Define lipids as fats and fat like substance. 4.2 Define fat as mono-di-and tri–carboxylic esters of glycerides e.g.monoglycerides, diglyceridesand triglycerides. 4.3 List natural sources of fats. 4.4 Classify lipids into simple and complex lipids. 4.5 List members of classes in 4.4 above. 4.6 Describe with equation the hydrolysis of triglycerides. 4.7 Describe the hydrolysis of TAG with alkali to yield a mixture of soap and glycerol–(saponification) 4.8 Define saponification number, iodine number and free fatty acids(FFA) value of fats and oils(acylglycerols)	Lecture on the importance of lipids	Internet Books Journals charts	Test for fats in The laboratory e.g.by solubility test. Practical tests test for fats Carry out simple Chemical tests for triacylglycerides	Assist Students to carry out laboratory assignment.	Glasswares Bunsen burner Water bath Saturated And Unsaturated fat Liquid and Solid fats	Test Assignment Quizzes Examinations

General Objective 5.0: Understand the structure, properties, behavior and functions of proteins						
5.1 Classify proteins as globular or fibrous. 5.2 List natural courses of proteins 5.3 State the characteristics properties of the classes in 5.1above. 5.4 Explain with examples the role of different proteins in the functioning of living matter e.g. transport, structural, catalytic, regulatory, defense, etc. 5.5 Define prostheticgroup as a non-protein moiety of a complex protein. 5.6 Describe proteins in terms of their prosthetic Groups e.g. haemoproteins, glycoproteins, lipoproteins etc. 5.7 Describe the structure of a protein as a chain of amino acids which are chemically linked together by chemical bonds between carboxyl –alpha amino Groupson amino acids(Co-NH) 5.8 Draw the general structural formula for alpha amino	Lectures on classification of proteins Lectures on the functions of proteins	Charts Books internet	Identify Proteins in the laboratory	Practical Identification of protein	Protein Sample Million's reagent Biuret reagent tiles. dropers. Glassware Colorimeteror Spectrophotometer Waterbath	Test Assignment Quizzes Examinations

General Objective 6.0: Understand the Classification of Amino Acids and their structures						
6.1 Classify amino acids on the basis of the chemical nature of the side groups. 6.2 Describe the hydrolysis of protein to give amino acids as their final product 6.3 Explain D and L isomers within the amino acids. 6.4 Explain the amphoterismof aminoacids. 6.5 Define the term iso-electric point. 6.6 Determine the isoelectric point from a given titration curve. 6.7 Explain the general reactions of amino acids due to (a) NH2group and (b)–COOH group. 6.8 Explain that peptides are formed by condensation of amino acids and hydrolysis of proteins.	Lectures on amino acids side groups	Charts Journal Text books	Identify amino Acid generally and specifically.	Amino acid standards and test samples, Ninhydrin.	Protein Sample Million's reagent Biuret reagent tiles. dropers.	Test Assignment Quizzes Examinations
General Objective 7.0: Understand the structure and behaviorof Proteins						
7.1 Explain the primary, secondary, tertiary and quaternary structure of proteins. 7.2 List the types of interactions involved in:- • Secon dary • Tertiar y and	Lectures on the structures of protein Teaches protein denaturation.	Charts Text books journal				Test Assignment Quizzes Examinations

• Quaternary structures of proteins. 7.3 Describe denaturation of proteins with examples						

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: ORGANIC CHEMISTRY				
COURSE CODE: VLC 121				
DURATION	**Lecture:- 1Hour**	**Tutorial:-** Hours	**Practical:- 2** hours	**Total:- 3 Hours**
CREDIT UNITS: 3				
GOAL: This course is designed to enable the students acquire knowledge of the basics of Organic chemistry				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Understand the Classification of Organic compounds 2.0 Understand the Chemistry of Aliphatic Compounds 3.0 Understand the Chemistry of Aromatic Compounds 4.0 Understand the Composition and Basic Properties of Carbohydrates 5.0 Understand the general properties of Amino Acids and Proteins 6.0 Understand the properties of Lipids				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: ORGANIC CHEMISTRY		**Course Code: VLC 121**		**Contact Hours:3hrs/wk (45hrs/sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0 Understand the Classification of Organic Compounds						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 List the major	Lectures		Determine	Guide and		

classification of organic compounds. 1.2 Define homologous series as consisting of compounds with each successive member differing with – CH2 – 1.3 State the members of a homologous series and their physical properties. 1.4 Define the functional group. 1.5 Identify functional groups in alkanols, alkanals, alkanones, armines, alkanoic, acids, phenols, nitriles ethers, esters, amides etc. 1.6 Draw structures for the functional groups in 1.5 Above.		Classroom resources	qualitatively the elements present in an organic compound. Identify functional groups in organic compounds via qualitative chemical tests (reactions)	supervise students	Laboratory space and apparatus	Tests, Assignments, term papers, etc
General Objective: 2.0 Understand the Chemistry of Aliphatic Compounds						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Explain the general features of aliphatic hydrocarbons. 2.2 State the general formula,	List and illustrate	Classroom space, relevant textbooks, internet etc	Determine qualitatively the elements present in an organic	Demonstrate, guides and supervise the students	Laboratory space and laboratory apparatus	Tests, Assignments, Reporting of practicals.

CnH2n+2 to represent Alkane. 2.3 Name alkanes by using the IUPAC nomenclature 2.4 List the industrial uses of alkanes. 2.5 List natural sources of alkanes 2.6 State the general formula, CnH2n to represent alkenes 2.7 Explain the bonding in carbon atom as Sp2 hybridized in alkene 2.8 Name alkenes by using the IUPAC nomenclature 2.9 Represent the addition reactions of simple alkenes by means of chemical equation e.g. with Br2 HBr and H2. 2.10 Undrestand the use of curly arrows to represent reaction mechanisms 2.11 Use curly arrows to show the mechanism of the above addition	Explanation by describing, illustrating and enumerating		compound. Identify functional groups in organic compounds via qualitative chemical tests (reactions)	,,	, lab manual ,,	,,

reactions of alkenes 2.12 Explain the use of alkenes in the production of polymers e.g. PVC, polyethene polystyrene etc 2.13 Explain that the carbon in alkynes is Sp hybridized. 2.14 Represent the addition reaction of alkynes by means of simple equation e.g. reaction with H2,Br2 and HBr.. 2.15 Describe chemical tests for the unsaturation in alkenes and alkynes. 2.16 Describe the industrial uses of alkynes e.g. production of oxyacetylene flame, production of vinyl chloride in the production of polymers 2.17 Describe the general methods of preparation of the following aliphatic compounds: i. Alkanes ii. Alkenes iii. Alkynes 2.18 State the functional						

group of alkanol as –OH 2.19 State the general formula of alkanols as C_nH_{2n+1} OH. 2.20 Name alkanols using IUPAC nomenclature 2.21 Describe the general methods for the preparation of the following aliphatic compounds: alkanols, alkanals, alkanones and alkanoic acids 2.22 Describe the characteristic reactions associated with the aliphatic compounds in 2.21 above 2.23 Explain the following types of reactions applied in organic chemistry viz: i. Addition reaction ii Substitution reaction iii Elimination reaction						
General Objective: 3.0 Understand the Chemistry of Aromatic Compounds						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain aromaticity	Defines and draws the					

3.2 Write the structures of benzene and its homologues 3.3 Describe the physical and chemical properties of aromatic hydrocarbons (especially benzene). 3.4 Describe the following reaction of benzene; Friedel crafts (alkylation or acetylation), Substitution reactions (nitration, sulphonation, halogenation, etc. Addition reactions. 3.5 Describe the preparation of the following derivatives of benzene; phenols, aldelydes and ketones. 3.6 Describe the properties and reactions of the derivatives mentioned in 3.5 above	structures of benzene and its homologues Teacher uses illustrations					
General Objective: 4.0 Understand the Composition and Basic Properties of Carbohydrates						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Define Carbohydrate	Teacher defines					

4.2 List sources of carbohydrates. 4.3 Classify carbohydrates into monosaccharides, disaccharides, and polysaccharides. 4.4 Describe the structures of selected members of the groups in 4.3 above 4.5 Describe the general properties of the group in 4.3 above	Illustrations		Differentiate experimentally reducing sugars from non-reducing sugars	Teacher demonstrates, guides and supervises the students in the laboratory		
General Objective: 5.0 Understand the General Properties of Amino Acids and Proteins						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Describe the general formulae of Amino Acids 5.2 Identify the common Amino Acids from the general formulae 5.3 Enumerate the physical and chemical properties of Amino Acids 5.4 Explain the formation of dipeptides, oligopeptides and poly peptides 5.5 Describe proteins as	Description and identification					

made up of amino acids 5.6 List the various classes of protein e.g fibrous and globular protein 5.7 Describe the primary, secondary and tertiary structural levels of proteins 5.8 Describe Protein Denaturation 5.9 Explain Isoelectric point of amino acids and proteins						
General Objective: 6.0 Understand the Basic Properties of Lipids						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Define Lipids 6.2 List sources and types of Lipids 6.3 Differentiate between fats and oils 6.4 Describe the general properties of lipids e.g saponification.	Teacher defines and enumerates	Textbooks, internet etc	Tests for fats in the laboratory	Teacher Demonstrates, guides and supervises the students during the experiment	Laboratory space and apparatus	

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: OPTICS, WAVES AND ELECTROMAGNETIC RADIATION				
COURSE CODE: VLP 121				
DURATION	**Lecture:- 1hr**	**Tutorial:-** Hours	**Practical:-** 2hrs	**Total:- 3hrs/wk(45hrs/Sem)**
CREDIT UNITS: 3 CU				
GOAL: This course is designed to provide the students with an understanding of optics, atoms molecules, composition and structure and electromagnetic radiation				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Understand the principles of reflection and refraction at plane surfaces 2.0 Understand the principles of reflection and refraction at curved surfaces. 3.0 Understand the working principles of optical instruments and the human eyes 4.0 Understand the basic concepts of photometry 5.0 Understand the phenomenon of wave optics and sound waves 6.0 Understanding the atom, molecules composition and structure and Electromagnetic radiation				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: OPTICS, WAVES AND ELECTROMAGNETIC RADIATION		**Course Code: VLP 121**			**Contact Hours: 3hrs/wk(45hrs/Sem)**	
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0 Understand the principles of reflection and refraction at plane surfaces						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Explain reflection of ray 1.2 Explain ray and beam 1.3 List types of beam 1.4 State the laws of reflection of light 1.5 State the nature or characteristics of the image formed by the plane mirror (size, lateral inversion, virtual, position).			Determine experimentally the laws of		Plain mirror optical pins, drawing board	

1.6 Explain the images formed by two inclined mirrors and its applications 1.7 Describe the deviation of light by a plane mirror 1.8 Explain the effect of rotating a plane mirror about an axis through the point of incidence (optical lever). 1.9 Apply the principle in 1.8 above to the mirror galvanometer' and other optical instruments 1.10 Define refraction of light 1.11 State the laws of refraction 1.12 Define refractive index in terms of velocities of light in vacuum and in the medium 1.13 Define critical angle 1.14 State the relation between refractive index and critical angle. 1.15 Explain the phenomenon of total internal reflection 1.16 Describe refraction through a prism 1.17 Describe the application of total internal reflection in the construction of the following; submarine periscope, Binoculars, optical fibre and kaleidoscope 1.18 Describe the experiment to determine the angle of minimum deviation			reflection at plane surfaces. Determine experimentally the angle of reflection of ray when the mirror is rotated Determine experimentally the laws at refraction Determine the refractive index of solid and liquid by real and apparent depth method			
General Objective: 2.0 Understand the principles of reflection and refraction at curved surfaces.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

2.1Describe the shape of a curved mirror 2.2 Define pole, principal locus, centre 01 curvature, principal axis, focal length, radius of curvature of curved mirrors. 2.3 State the relation between radius of curvature and focal length 2.4 List types of curved mirror 2.5 Describe the images formed by curved mirrors 2.6 Construct ray diagrams for the images in 2.3 above. 2.7 Derive the mirror formula 2.8 State the real - is - positive and artesian conventions. 2.9 Define magnification 2.10 Describe the shape of lenses 2.11 List types of lenses 2.12 Define optical centre, principal focus, principal axis, radius of curvature of lenses 2.13 Derive lens formula 2.14 Explain defects of lenses (spherical and chromatic aberation) and their corrections	Solve numerical problems using the mirror formula (and ray diagrams		Determine experimentally the focal length of a convex mirror. Determine the refractive index of liquid using a concave mirror Determine experimentally the focal length of a converging lens using the lens formula Determine the focal length of a converging lens by magnification method (Ray box should be used) Determine local length of two thin lenses in contact using the formula. Determine experimentally the focal length of a diverging lens Determine the refractive index of a liquid using a converging			

			lens and a plane mirror			
General Objective 3.0 Understand the working principles of optical instruments and the human eyes						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain the magnifying action of lens 3.2 Explain the working of: i) Simple microscope ii) Compound microscope iii) Astronomical telescope iv) Galilean telescope v) Terrestrial telescope 3.3 Describe the working of a spectrometer 3.4 Draw a labelled diagram of the human eye 3.5 Describe the functions of the parts of the eye	Calculate the magnifying power of the optical instruments of 3.2 Calculate the magnifying power, angular magnification of optical instruments Calculate the focal lengths of the objective and eye		Derive expression for angular magnification of a lens Measure angle of deviation, minimum			

3.6 Explain the defect of the eye and their correction	lenses of compound microscope given the magnification and other necessary parameters.		deviation angle of a prism using spectrometer			
General Objective: 4.0 Understand the basic concepts of photometry						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Define radiant power, radiant flux, luminous flux 4.2 Define illuminance, luminance and luminous intensity 4.3Describe the international standard source of light 4.4 Define solid angle 4.5 Define luminous efficiency 4.6 State the relationship between illuminance and luminous flux; luminous intensity and luminous flux 4.7 State cosine law and inverse square law 4.8 Describe lummer - Brolum photometer and the flicker photometer 4.9 Compare intensities of light sources.	Calculate the luminous intensity I and luminous flux F, of a source Calculate the luminance of a surface.	Text books	Measure experimentally the Intensity of a light source			
General Objective:5.0 Understand the phenomenon of wave optics and sound waves						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Explain the term waves		Textbooks				

5.2 Classify waves into mechanical and electromagnetic waves 5.3 Distinguish between the two types of waves:- Longitudinal and transverse waves 5.4 List examples of waves 5.5 Define wave parameters e.g. frequency, wavelength, wave velocity, amplitude 5.6 Explain sound waves in air columns and waves in strings 5.7 Define resonance 5.8 List examples of resonance in other physical events 5.9 Identify the factors that affect the velocity of sound waves in pipes 5.10 Establish the relationship between the frequency of waves in a straight string and the length and tension by dimensional analysis 5.11 Explain what is meant by Doppler effect 5.12 List examples of Doppler effect in sound and light 5.13 Explain the terms: i) Reflection ii) Refraction iii) Super Position vi) Interference and diffraction as they relate to waves 5.14 State the conditions necessary for interference and diffraction to occur	Calculate the velocities of types of waves in different media with different parameters.		Determine experimentally the velocity of sound in air using a resonance tube. Verify experimentally relationship length, tension, massper unit length of string using a sonometer bridge Demonstrate experimentally the relationship between the terms, in5.14 using the			

5.15 Explain the term beat 5.16 Define beat frequency 5.20 Determine beat frequency 5.17 Explain the electromagnetic spectrum in relation to wave lengths and frequency 5.18 Distinguish between emission and absorption 5.19 Explain line, band andcontinuous spectra 5.20 Explain the use of spectroscopy in analysing compositions of substances.			ripple tank.			

General Objective:6.0 Understanding the atom, molecules composition and structure and Electromagnetic radiation

Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Explain the experimental basis of atomic theory using the Bohr's theory of hydrogen atom and many electron atoms. 6.2 Describe atomic spectra particularly the H atom emission spectrum 6.3 Discuss, qualitatively, the Energy States of the hydrogen	Lecture, diagrams, charts.					

atom in the Bohr model 6.4 Relate these Energy States to the observed emission spectra 6.5 Explain the limitations of the bohr model 6.6 Describe the wave-particle duality of electrons and energy 6.7 State the different main energy levels of an atom, namely K, L, M… 6.8 Correlate the energies of the electron in the K, L, M, N,…shells with the values of the principal quantum no n= 1,2,3,4,…… 6.9 Relate the lines of the hydrogen emission spectrum to electronic energy level. 6.10 State Hund's rule, Heisenberg uncertainty principle Pauli exclusion principle. 6.11 Explain 1.10 above in relation to the	Lecture, diagrams, charts. Illustrate with diagrams ,photographic plates, thermometer e.t.c		Should be able to tabulate the electromagnetic radiation under the heading: ionization, magnetic electric field deflection, charge, frequency, wavelengths e.t.c Able to use and read detection of electromagnetic radiation			

concept of orbitals including subsidiary energy levels (s, p, d) orbitals. 6.12 Explain the significance e of the four quantum numbers 2.1 Describe the shapes of s and p orbitals. 6.13 Sketch the s and p orbitals 6.14 Describe the determination of relative atomic and molecular masses. 6.15 Explain isotopes and their use Describe the use of mass spectrometer as a means of proving the existence of isotopes. 6.16 Define the following:: (i) Atomic number, (ii) Mass number, (iii) Atomic mass, 6.17 Define electromagnetic radiation 6.18 List the family of electromagnetic radiation						

6.19 State the sources and origins electromagnetic radiation 6.20 Enumerate various substances to use in the detection of electromagnetic radiation 6.21 Explain the production of X-rays 6.22 List types of X- rays 6.23 Define basic radiation terms associated with X- rays: radiation dose, maximum permissible level e.t.c						

ND II

FIRST SEMESTER

PROGRAMME: NDVETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: Introduction to Veterinary Pathology				
COURSE CODE: VLT 211				
DURATION	**Lecture:-**	**Tutorial:-** Hours	**Practical:-** **4**hours/week	**Total:- 60 Hours**
CREDIT UNITS: 4				
GOAL: This course is designed to introduce students to the basics in Veterinary Pathology				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Know the basic concepts and specialties of Veterinary Pathology
2.0 Know the common TERMS IN USE IN Veterinary Pathology
3.0 Understand appearance and meaning of common pathology change
4.0 Know the basics involved in handling/processing of dead animal
5.0 Understand preparation and use of tissue preservation
6.0 Know the concept surrounding disposal of dead animals

PROGRAMME: NDVETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE:		**Course Code: VLT 211**		**Contact Hours:**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Understand why we study Pathology	Teacher to explain why	Textbooks Journal	-	-	-	Tests Quiz Examination
2.0 2.1 Give definition of common terms in pathology	Teacher to list term and define	Textbooks Journal	-	-	-	Tests Quiz Examination
General Objective: 3.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

3.1 Describe the different pathologic changes (circulatory, inflammatory, growth etc) 4.0 4.1 Describe the processes involved in post mortem examination of animal	Teacher describes these changes Teacher explains the processes	Textbooks Audio-Visual Textbooks Practical manual, Sketches, Drawings, Audio-visual	Identify these pathologic changes Identify the pathologic changes	Demonstrate these Pathologic changes Teacher perform post-mortem examination	Practical manual, Audio-visual, Post mortem room with Post mortem room with complete	Tests Quiz Examination Tests Quiz Examination
General Objective: 5.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Practice the preparation of preservation 5.2 Determine the use of preservatives	Teacher explain preparation Teacher describes	Textbooks Practical Manuals Journal Practical manuals Textbooks	Identify preparation of preservatives Perform fixation of tissues	Demonstrate preparation of fixation Teacher show students how to preserve tissue	Glass container Salts Chemicals Weighing balance Distillate Glass/Plastic container Preservatives Practical manual	Tests Quiz Examination Tests Quiz Examination
General Objective: 6.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Explain why dead animals are to be disposed of carefully. 6.2 Perform the safe disposal	Teacher outlines why Teacher describes the processes	Textbooks Journals Textbooks, Audio-visual, Journals	Practice disposal of dead animals	- Teacher demonstrate the process	- Incinerator Shovel Chemicals Digger	Tests Quiz Examination Tests Quiz

of dead animals						Examination

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: INTRODUCTION TO VETERINARY MICROBIOLOGY				
COURSE CODE: VLT 212				
DURATION	**Lecture:- 2hrs**	**Tutorial:-** Hours	**Practical:-** 2hrs	**Total:-** 4
CREDIT UNITS: 4				
GOAL: This course is designed to introduce the students to the basic rudiment of microbiology				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Know the meaning of veterinary microbiology and the History of microbiology.

2.0 Know the general characteristics of microorganisms.

3.0 Understand Microbial growth curve and factors influencing microbial growth.

4.0 Understand koch's postulates.

5.0 Know the isolation and identification techniques.

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY MICROBIOLOGY			**Course Code: VLT 212**		**Contact Hours: 4hrs/wk (60hrs/sem)**	
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Know the meaning of veterinary microbiology and the History of microbiology.						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Practical

1.1 Explain veterinary microbiology 1.2 Discuss brief history of microbiology 1.3 Explain the scope and relevance of Microbiology 1.4 Discuss Microscopy and types	Explain Discussion Explain scope and importance Discuss microscopy and various types	Textbooks Journals Internet	- - - Identification of microscopes and various types	- - - Display and show parts, and types of microscopes.	- - - Practical Manual Textbooks	Report Assignment Test Quiz Examination

General Objective: 2.0: Know the general characteristics of microorganisms.

Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Explain the characteristics of :- a) Bacteria b) Fungi c) Virus d) Algae e) Protozoa	Explanation	Textbooks Internet Microorganism Multimedia slides	-	-	-	Assignment Test Quiz Examination

General Objective: 3.0 Understand Microbial growth curve and factors influencing microbial growth.

Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 explain microbial growth	Lectures	Textbooks Internet	Preparation of culture	Demonstration	Textbooks	Assignment

3.2 describe the microbial growth curve 3.3 explain the factors that influence microbial growth 3.4 explain a) physical methods b) controlling microbial growth c) chemical methods controlling microbial growth	Draw and explain the curve List and explain the methods	Multimedia Slide projector Journals	medium e.g NA,BA etc Inoculation of media with table top, skin or saliva swab	demonstration	Practials manual journals	Test Quiz Examination

General Objective: 4.0: Understand koch's postulates

Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 state and explain the knoch's postulates with specific examples	Explain with examples	Textbooks Internet Journals				Assignment Test Quiz Examination

General Objective: 5.0 Know the isolation and identification techniques.

Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Explain isolation of microorganism 5.2 Explain isolation procedure	Explain Isolation Explain the procedures	Textbooks Journals Internet Multimedia projectors	Culture on media Colonial appearance of bacteria e.g. size,	Demonstrate Demonstrate	Practical manuals Textbooks	Practical Report Test Examinations

of different microorganisms 5.3 Discuss the method of identification of microorganisms 5.4 List the staining techniques for the different microorganisms.	Discuss identification techniques Explain the staining techniques.		shape, color, consistency and texture. Identification of stains	Display and identify the stain type	Journals	Assignment

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: INTRODUCTION TO VETERINARY SURGERY				
COURSE CODE: VLT 213				
DURATION	**Lecture:- 2 Hours**	**Tutorial:-**	**Practical:- 2 Hours**	**Total:- 4Hr/Wk(60Hrs/Sem)**
CREDIT UNITS: 4 CU				
GOAL: This course is designed to enable students acquire basic knowledge in surgery				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

1.0 Know the history of mycology

2.0 Know fungi identification methods

3.0 Know the fungal diseases of animal

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO VETERINARY SURGERY		**Course Code: VLT 213**		**Contact Hours: 4Hrs/Wk(60Hrs/Sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Know the history of mycology						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define Veterinary Surgery 1.2 Explain the History of Veterinary Surgery 1.3 Explain the current status of Veterinary Surgery	Explain Veterinary Surgery	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination
General Objective: 2.0: Know fungi identification methods						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 List common terminologies used in Veterinary Surgery 2.2 Explain each terminology	Explain when to use each terminology	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination
General Objective: 3.0 Know the fungal diseases of animal						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain how presurgical evaluation of patient is done 3.2 Outline the	Explain the differences in presurgical evaluation and emergency	Textbooks Internet Journals Projectors				Assignments Tests Quizzes

sequence of events before and during surgery 3.3 Explain how post-surgical evaluation is done	surgical procedures					Examination

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: VETERINARY NURSING				
COURSE CODE: VLT 214				
DURATION	**Lecture:-1**	**Tutorial:-** hrs	**Practical:-** 2hrs	**Total:-** 45hrs/Semester
CREDIT UNITS: 3				
GOAL: This course is designed to acquire skills necessary for nursing care				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Know basic steps and instrument for nursing care				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: VETERINARY NURSING		**Course Code:** VLT 214		**Contact Hours:**hrs/Semester		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective 1.0: Know basic steps and instrument for nursing care						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 List techniques involved in nursing 1.2 Explain routes of medication 1.3 Explain how to carry out Bandaging and splinting 1.4 Explain procedure for giving medications 1.5 Explain first aid to animals and how it is administered	Explain wound dressing, drug administration according to prescription Describes routes of administering drugs and biological Describe types of Bandag application and splints Explain how and when various medications can be given Describe first aid, recognize injury and take action	Text books Journal Internet	Demonstrate wound dressing, Bandaging, drug administration and composition Show route of medication Show splint application Demonstrate giving medication e.g. Intravenous, Intramuscular, Intrape……. Demonstrate how to recognize problem minimize injury and take action	Show how wound dressing, Bandaging, Drug administration and composition Show rate of medication Show splint application Show giving medication in different routes of administration Show how to recognize problem, minimize injury and take action Show how to manage the wound and		Assignment, Quizzes, Test, Examination theory and practicals)

1.6 Discuss procedures necessary for successful treatment, for wound and other emergencies	Explain how severe the patient condition and describe treatment		Demonstrate how to manage the wound and other emergencies	other emergencies		

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: Veterinary Laboratory Procedures (Glass fabrication, care and maintenance of equipment)				
COURSE CODE: VLT 215				
DURATION	**Lecture:- 2 hours**	**Tutorial:-** Hours	**Practical:- 2** hours	**Total:-4 h**
CREDIT UNITS:4				
GOAL: This course is designed to acquaint students with knowledge of glass fabrication and maintenance				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0. Know the the principles of vacuum production				

2.0. Know common types of vacuum

3.0. Know different types of glasses used as laboratory waves

4.0. Know the construction of simple glass ware

5.0. Know the care and maintenance of glass blowing equipment

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY					
COURSE TITLE: Veterinary Laboratory Procedures (Glass fabrication, care and maintenance of equipment		**Course Code: VLT 215**		**Contact**	
COURSE SPECIFICATION: Theoretical content 2 hours			**Practical Co**		
General Objective: 1.0: Know the principles of vacuum production					
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Lea Res**
<u>Vacuum Production</u> 1.1. Classifying vacuum pressure gauges eg low medium, high, etc 1.2. List the units in vacuum 1.3. List the various components of a simple vacuum set-up	Lecture Show gauges to students Lecture Lecture	Vacuum Pressure gauge	Operate a simple vacuum system	Get students involved in the operation of vacuum system	Vac pur
General Objective:2.0: Know common types of vacuum					
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Lea Res**
<u>Types of Vacuum</u> 2.1. List common types of vacuum pumps: rotary and diffusion pumps 2.2. Describe the application of each of the pumps in 2.1 above	Lecture Emphasize areas of application of pumps	Rotary pump Diffusion pump	Operate pump in 2.2	Ensure each student has access to and operate a pump	Rot pur Dif pur

General Objective:3.0: Know common types of vacuum					
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Lea Res**
<u>Types of glasses used as lab wares</u> 3.1. List the types of glasses suitable for laboratory glass wares eg. Borosilicate, soda lime, silica glass, etc 3.2. State properties in glasses in 3.1 above eg. Transparency and durability etc	Lecture and demonstration Teacher brings samples to class to show students	Soda glass, Borosilicate Silica Glass	Identify types of glasses by chemical and physical methods	Lecture practical demonstratio n with soda and borosilicate with rods	
General Objective 4.0: Know the construction of simple glass wares					
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Lea Res**

Construction of simple glass wares 4.1. Identify various tools and equipment used in glass blowing workshops 4.2. Describe and apply glass cutting techniques 4.3. Describe and apply various methods of glass manipulation eg simple point pulling	Lecturer and teacher parades a number of these tools Teacher ask students to tabulate tools, draw and indicate uses	Glass cutting knife, calliper gauges, analing machine, lathe machine, glass cutting and calibrating machine, etc	Join two glass tube Blow bulbs at the end and in the middle of the tubes	Guide students in glass fabrication Teacher demonstration and construction of glass ware	

General Objective:5.0: Know the care and maintenance of glass blowing equipment					
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Lea Res**
Care and maintenance of glass blowing equipment 5.1. Identify various methods of taking care of equipment eg lubrication, servicing for valves, fittings etc 5.2. Describe the maintenance of glass blowing equipment	Lecturer demonstrate with some lubricants Check electrical connections and gas fittings	Lubricants, lathe machine, laset glass cutter Lathe machine Anaeling furnace	Lubricate a machine, dismount, service and couple laset glass cutter Check for optimal performance of lathe machine	Guide students in glass fabrication Teacher demonstration and construction of glass ware	Gu stu lub son ma Sup stu che the fitt

COURSE TITLE: VETERINARY COMMUNICATION				
COURSE CODE: VLT 216				
DURATION	**Lecture:-** 1hrs	**Tutorial:-** hrs	**Practical:-** 2hrs	**Total:-** **15**hrs/Semester
CREDIT UNITS: 1				
GOAL: This course is designed to enable students develop the ability to communicate on the field				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Know the concept of communication and communication skills 2.0 Know and apply the theories of communication 3.0 Understand the importance of communication in an a organizational set up 4.0 Understand the process of communication 5.0 Know communication flow in order to communicate effectively with others 6.0 Understand interpersonal and inter-group relationship for effective communication 7.0 Know the barriers to effective communication 8.0 Know how to write technical reports				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: VETERINARY COMMUNICATION		**Course Code:** VTL 216		**Contact Hours:**15hrs/Semester		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective 1.0:Know the concept of communication and communication skills						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define: - Communication - Communication skills	Defines Communication	Text books, Journals, e-library,/Internet, Posters/Chart	Demonstrate ability to give acceptable definition of	Examine critically all the variables necessary for	As shown before	Quiz, Test, Assignment,

1.2 Outline brief history of communication 1.3 List communication skills i.e. listening, speaking, reading and writing	Gives a brief outline of history of communication Lists: Skills of communication Functions of communication	s, Audio Visuals (AV) As in 1.1 above	communication Exhibit listening speaking, reading, and writing skills Make oral presentations	communication Role Play Give culture-specific history of communication compare with modern technology		Examination

General Objective 2.0:Know and apply the theories of communication						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Define theories of communication 2.2 List communication theories related to communication 2.3 Explain each theory listed in 2.2 above 2.4 Explain the purpose for use of theories in communication	Gives definition of communication theory Relates uses of theories to communication process in VLT		Apply communication theory Apply communication theory to VLT			
General Objective3.0**:** Understand the importance of communication in an a organizational set up						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain the importance of						

communication in an organization 3.2 Explain the importance of effective communication in VLT 3.3 Explain - register - factors influencing register 3.4 Identify register peculiar to VLT						
General Objective 4.0:Understand the process of communication						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Analyze in detail the communication process 4.2 Describe different methods of communication - Oral - Written - Non-Verbal - Cultural - Modern technology 4.3 Explain the roles of the speaker, message encoding, audience decoding						
General Objective 5.0: Know communication flow in order to communicate effectively with others						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

5.1 Describe the directions of of communication flow from internal to external 5.2 Explain effective Flow						

General Objective 6.0:Understand interpersonal and inter-group relationship for effective communication						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Explain: - Interpersonal - Intra-personal - Inter-group Relationship 6.2 Differentiate between the various terminologies listed above						
General Objective 7.0:Know the barriers to effective communication						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
7.1 Explain barriers to communication 7.2 Identify the barriers to effective communication 7.3 State the impact of barriers to communication e.g. - Break down - Tension - War 7.4 Explain how barriers can be eliminated to foster communication						

General Objective 8.0:Know how to write technical reports						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
8.1 Explain technical reports 8.2 List types of Technical - Letters (business) - Memo - Invitation - Sanctions - Communication - Query - Promotion - Appointment - Dismissal, etc.						

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: RURAL SOCIOLOGY				
COURSE CODE: VLT 217				
DURATION	**Lecture:- 1 Hours**	**Tutorial:-**	**Practical:-**	**Total:- 1Hr/Wk(15Hrs/Sem)**
CREDIT UNITS: 1 CU				
GOAL: This course is designed toenable the students understand the behavior of rural people and rural society				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Understand common terms used in sociology 2.0 Understand concept of rural sociology 3.0 Know the rural settlement patterns and village organizations 4.0 Understand social change in the society 5.0 Know the rural social institution in Nigeria 6.0 Know communication patterns in a rural area				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: RURAL SOCIOLOGY		**Course Code: VLT 217**		**Contact Hours:1Hrs/Wk(15Hrs/Sem)**		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective: 1.0: Understand common terms used in sociology						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define the following: a. Sociology b. Rural Sociology	Explain the content in 1.1	Textbooks Internet Journals Projectors				Assignments Tests Quizzes

c. Agricultural Laboratory d. Rural e. Culture f. Norms g. Values h. Beliefs i. Roles j. Status k. Power						Examination
General Objective: 2.0: Understand concept of rural sociology						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Explain the following: a. Change agent b. Cosmopolites c. Ethnocentrism d. Xenocentrism e. Institution f. Incest-Taboo 2.2 Explain the historical development of rural sociology in Nigeria	Explain the content in 2.1 Discuss the historical development	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination
General Objective: 3.0 Know the rural settlement patterns and village organizations						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain: a. Settlement pattern b. Village organization in Nigeria 3.2 List the settlement patterns in rural areas 3.3 State factors that influence settlement patterns 3.4 Explain the merit and demerit of the various settlement patterns.	Explain the contents in 3.1 – 3.4	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination
General Objective: 4.0 Understand social change in the society						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**

4.1 Define social change in a rural area 4.2 Identify the characteristics of rural change 4.3 Explain factors that influence rural change patterns	Explain the contents in 4.1 – 4.3	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination
General Objective: 5.0 Know the rural social institution in Nigeria						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1 Explain the following terms: a. Marriage and the family b. Rural school system c. Religious institution d. Rural economic institution 5.2 List types of rural social institutions in Nigeria – Marriage – Religious Institutions – School – Political Institutions – Traditional Institutions – Economic Institutions 5.3 Describe the factors that affect social change in the rural area:- – Type of marriage – Educational Status – Family type/size	Explain the contents in 5.1 – 5.3	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination

– Economic power i.e. size of farm						
General Objective: 6.0 Know communication patterns in a rural area						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Define Communication 6.2 Explain patterns/types of communication in a rural set-up 6.3 State basic principles of Curriculum relevant to Veterinary medicine	Explain the contents in 6.1 – 6.3	Textbooks Internet Journals Projectors				Assignments Tests Quizzes Examination

GRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY

RSE TITTLE : Research Methodology

RSE CODE: VLT 218

ATION	**Lecture: 2hrs**	**Tutorial:**	**Practical: - 0**	**Total: (30hrs/sem)**

S: 2

L: This course is designed to enable the students carry out independent research projects.

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

now what a research is and how to carry it out

nderstand basic principles of probability

nderstand the use and importance of some measures of central tendency and measures of dispersion in summarizing data

now the methodology applied in research

now the various methods of data collection

derstand the presentation of research report.

PROGRAMME:NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE: Research Methodology **Course Code:**VLT 218 **Contact Hours:**30hrs/sem						
COURSE SPECIFICATION: Theoretical ContentPractical Content						
General Objective: 1:Know what is a research and how to carry it out						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define the following: • Research, • Scientific method, • Theory, • Hypotheses. 1.2 Describe various types of research e.g. • Descriptive, • Exploratory • Casual, • Experimental and • Comparative etc. 1.3 Explain the stages involved in research: • Formulation of a research problem • Literature Review • Hypothesis • Justification of the research • Data collection and analysis • Findings etc.	i. Explain hypothesis and its characteristics. ii. Explain validation and its problem in research. iii. Distinguish among specific, general null and alternate hypothesis. iv. Describe the relationship between hypothesis and problem statement. v. Explain the relevance of literature review in research. vi. Explain the sources of literature. vii. Describe the organisation	Textbooks, laptop, overhead projectors, journals, writing materials.				Assignment Seminar Presentation

	and referencing of literature. viii. Give assignment					
General Objective:	2: Understand basic principles of probability.					
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 Define random variable 2.2 Explain the concept of randomness 2.3 Define probability 2.4 State the laws of probability 2.5 Define conditional probability 2.6 Solve simple problems involving the laws of probability as they relate to their disciplines.	i. Explain variables, their types and relevance. ii. Explain consideration in the choice of variables. iii. Explain control problems of variables	Textbooks - Journals	-			Quiz Test Assignment
General Objective:	3: Understand the use and importance of some measures of central tendency and measures of dispersion in summarizing data					
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1 Explain the following: • arithmetic mean, • geometric mean, • median mode and • Harmonic mean. 3.2 Compute the measures in 3.1 above: (a) ungrouped data (b) grouped data 3.3 Explain the uses of geometric and harmonic mean 3.4 Calculate the following in a given set of data: • quartiles • deciles • percentiles	Explain with examples the measures of central tendency and the measures of dispersion	Textbooks - Journals Projector				Quiz Test Assignment

3.5 List the merits and demerits of the above measures of central tendency 3.6 Define measures of dispersion 5.7 State the importance of the measures of dispersion 3.8 Calculate the following • mean deviation • Semi Inter quartile range • Variance and • standard deviation 3.9 Calculate the measures of the dispersion listed in 3.8 given in a sets of data						
General Objective: 4: Know the methodology applied in research						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1 Explain sampling methods 4.2 Discuss the two major types of sampling: • probability sampling and • Non-probability 4.3 Explain the uses of sampling in research. 4.4 State the advantages and disadvantages of the two major types of sampling.	iExplain each of the method in probability sampling such as random, • systematic, • stratified and • clusters ii Explain Non-probability sampling such as: • accidental, • quotas and • Purposive.					Quiz Test Assignment

	iii. Explain population, sample and representativeness. iv.Describe types ofsampling methods. v. Explain need for samples					
General Objective: 5: Know the various methods of data collection						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
5.1Define data 5.2 State the types of data: • primary, and • secondary data 5.3 Explain the methods of collecting data: • observation, • questionnaire, • interview 5.4 Describe how to design questionnaires for research. 5.5 Explain how to administer questionnaires and interviews. 5.6 Design sample questionnaires for research. 5.7 Administer the questionnaires in 5.6 above.	Explain the following research instruments: 1. Questionnaire 2. Observation 3. Interview 4. Ratings, etc. ii. Describe pitfalls of each instrument in above.	Textbooks, laptop, overhead projectors, journals, writing materials.				Quiz Test Assignment
General Objective: 6: Understand the presentation of research report						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
6.1 Explain the general format of a research report, e.g.	Explain research report and	Textbooks, laptop,				Assignment

Preliminaries: • preface • foreword • Approval page • Title page • Dedication • Acknowledgement • Table of contents • List of illustrations e.g. maps/pictures, diagrams, figures and tables Main part • Introduction • Aims and Objectives • Limitations and Delineations • Main text • Conclusions and Recommendations • The Appendix • Glossary • Bibliography/References 6.2 Explain the use of footnotes references and bibliography 6.3 Outline the use of abbreviations in citation	its contents. ii. Conduct test Guidance for students using examples of good reports. Reference to exercisesto review relevant literature etc. Identify the contents of research report. 1. Introduction 2. Literature Review 3. Research Method 4. Data Presentation and Analysis 5. Summary, Conclusion and Recommendation 6. References	overhead projectors, journals, writing materials.				Seminar Presentation

ND II

SECOND SEMESTER

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: RECORD KEEPING AND DATA MANAGEMENT				
COURSE CODE: VLT 221				
DURATION	**Lecture:-** 1 hr	**Tutorial:-** hrs	**Practical:-** 0hrs	**Total:-** 15hrs/Semester
CREDIT UNITS:				
GOAL: This course is designed to give background to records and its importance				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				
1.0 Know the principles of data collection and record keeping and data management				

2.0 Know how to use appropriate data storage devices available

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE: RECORD KEEPING AND DATA MANAGEMENT		**Course Code:** VLT 221		**Contact Hours:**15hrs/Semester		
COURSE SPECIFICATION: Theoretical content			**Practical Content:**			
General Objective 1.0:Know the principles of data collection and record keeping and data management						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Explain data collection 1.2 Describe importance of record keeping 1.3 Explain data management	Define data and data collection Explain the importance of record keeping Explain data management	Text books Journals Internet				Assignment Tests, Quizzes Examination
General Objective 2.0:Know how to use appropriate data storage devices available						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1 List appropriate data storage devices available	Explain appropriate data storage					

2.2 Explain the following techniques: - Systemic collection - Recording; storage Retrieval, management and reporting of relevant information in veterinary domain 2.3 Explain the following terms: P…. records Billing, estimates	devices available Describe use of appropriate devices for data collection and processing					

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: Seminar Presentation				
COURSE CODE: VLT 222				
DURATION:	Lecture: -	Tutorial: -	Practical: - 1hr	Total: 1hrs (15hrs/semester)
CREDIT UNITS: 1 CU				
GOAL:This course is designed to expose the students to practical skills for report writing and Presentation				
GENERAL OBJECTIVE: On completion of the course, the student should be able to:				
1.0 Understand concepts used in seminars and seminar writing. 2.0 Know the stages involved in seminar preparation and writing. 3.0 Demonstrate presentation of seminar paper.				

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE: Seminar Presentation Course Code: VLT 222 Contact Hours: 1hrs (15hrs/semester)						
COURSE SPECIFICATION: Theoretical Content:Practical Content:						
General Objective 1.0: Understand concepts used in seminars/seminar writing						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1 Define: - Seminar - Symposium - Workshop - Conference - Summit - Colloquium. 1.2 Describe the processes of conducting each type listed in 1.1 above. 1.3 Identify ways of choosing themes/topics for seminars	Lecture, brainstorming	Lectures notes Pictures Charts Books Journals Seminar papers				Assignment, Test, Examination
General Objective 2.0:Know the stages involved in seminar preparation and writing						
Specific Learning Objectives	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**
2.1 Explain the process of Choosing a seminar topic 2.2 Describe how to gather materials for seminar paper including data management.	Lecture, brainstorming	Lectures Pictures Charts Books Journals	2.1 Identify the target audience Choose a seminar topics	Guide the students to identify the target audience, choose a topic and prepare a	Journals, books, Sample seminar papers	Assignment, report writing

2.3 Describe styles in seminar paper preparation and presentation. 2.4 State how to identify target for seminar presentation. 2.5 Describe the use of peer review in seminar paper			Prepare a seminar paper	seminar paper		
General Objective 3.0:Demonstrate presentation of seminar paper						
Specific Learning Objectives	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**	**Specific Learning Objectives**
3.1 Describe how to prepare for seminar presentation (check list of material needed, method of presentation etc). 3.2 Describe how to capture your audience. 3.3 Describe styles of seminar presentation 3.4 Explain ways of convincing your audience 3.5 Describe ways of summarizing your points	Lecture, brainstorming, facilitation, demonstration	Lectures Pictures Charts Books Journals	2.2 Write a Seminar paper. Present a seminar paper. Conduct evaluation of seminar paper presented	Guide and coordinate students' presentation. Evaluate and score papers presented	Seminar papers, moderators, PAS,	Paper presentations

PROGRAMME:NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE: Project				
COURSE CODE:VLT 223				
DURATION:	Lecture: 0	Tutorial: 0	Practical: 3	Total:45hrs/sem
CREDIT UNITS: 3				
GOAL: This project provides the student with an opportunity to investigate and report on a specific aspect of microfinance and enterprise development				
GENERAL OBJECTIVE: On completion of the course, the student should be able to:				
1.0 Review current literature pertaining to a specific issue or problem 2.0 Assess the extent of the issue or problem in practice 3.0 Gather and analyse information to identify potential solutions and reach a conclusion 4.0 Produce a final report on the project				

PROGRAMME: NATIONAL DIPLOMA IN VETERINARY LABORATORY TECHNOLOGY						
COURSE: Project		**COURSE CODE:** VLT 223		**CONTACT HOURS: 45hrs/sem**		
COURSE SPECIFICATION: Theoretical Content			**Practical Contents**			
General Objective 1.0: Review current literature pertaining to a specific issue or problem						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Evaluation**
1.1. Choose, under guidance, an appropriate topic for investigation 1.2. Review current literature to relevant tochoose of topic	Guide students in selecting a suitable topic Provide guidance in finding sources	List of available topics Notes Internet Textbooks Internet	Students should select a suitable topic and produce a plan of action setting out key targets to meet over the semester Review current literature to relevant to choose of topic	Support students in planning their activities Support students in their research. Provide guidance in finding appropriate sources	List of available topics Notes Internet Textbooks Internet	Final Project
General Objective 2.0: Assess the extent of the issue or problem in agricultural practice						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
2.1. Investigate the issue or problem in practice	Support students in their investigation	Textbooks Internet Notes	Students should identify required information and appropriate methods of	Guide students in determining the most appropriate data collection strategy for	Textbooks Internet Notes	Final Project

			data collection	the specific issue		
General Objective 3.0: Gather and analyse information to identify potential solutions and reach a conclusion						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
3.1. Collect information according to agreed methods.	Support students in data collection	Textbooks Notes Data sheets	Analyse the data collected in order to reach a conclusion	Supervise students in data analysis	Textbooks Notes Data sheets Statistical packages	Final Project
General Objective4.0: Produce a final report on the project						
Specific Learning Objectives	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
4.1. Produce final written report on project	Guide students in the production of their written report	Internet Notes Textbooks	Students should produce a final report on their project	Guide students in the production of their written report	Internet Notes Textbooks	

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY				
COURSE TITLE:				
COURSE CODE: VLT				
DURATION	**Lecture:- Hours**	**Tutorial:-**	**Practical:-**	**Total:- Hr/Wk(Hrs/Sem)**
CREDIT UNITS: CU				
GOAL: This course is designed to				
GENERAL OBJECTIVES: On completion of the course, the student should be able to:				

PROGRAMME: ND VETERINARY LABORATORY TECHNOLOGY						
COURSE TITLE:			**Course Code: VLT**		**Contact Hours:Hrs/Wk(Hrs/Sem)**	
COURSE SPECIFICATION: Theoretical content				**Practical Content:**		
General Objective: 1.0:						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Assignments Tests Quizzes Examination

General Objective: 2.0:						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Assignments Tests Quizzes Examination
General Objective: 3.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Assignments Tests Quizzes Examination
General Objective: 4.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Assignments Tests Quizzes Examination
General Objective: 5.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Assignments Tests Quizzes Examination

General Objective: 6.0						
Specific Learning Objectives:	**Teachers Activities**	**Learning Resources**	**Specific Learning Objectives:**	**Teachers Activities**	**Learning Resources**	**Evaluation**
						Assignments Tests Quizzes Examination

VETERINARY LABORATORY TECHNOLOGY PROGRAMME

LIST OF EQUIPMENT IN VETERINARY HOSPITAL

S/NO	DESCRIPTION OF ITEM	QUANTITY REQUIERED
1.	**RECEPTION**:	
	Reception chairs	8
	Table and chair	1 set
	File cabinet	1
2.	**CLINIC (SMALL AND LARGE ANIMAL)**	3
	Digital weighing scale	2
	Deep Freezer	4
	Suction machine	3
	Stethoscope	9
	Endo- tracheal tube	5
	Elizebathal collar	5 sets
	Hoof trimmer	4 sets
	Orphthalmoscope	4
	Stomach tube	1
	Emasculator	8
	Dog catcher	5
	Vaginal speculum	2
	Small animal examination table	2
	Burdizzo	2
	Probang	1
	Drip stand	1
	Medication cabinet	2
	Autoclave	2
	Steam sterilizer	2
	Electric dehorner	1
	Gas dehorner	1
	Otoscope	3
	Obstetric box	1
	Knapsack sprayer	4
	Clinical thermometer	20
3	**Surgical unit**	
	Anesthetic machine	3
	Theatre lamp	1
	Thermo-cautery machine	2
	Small animal surgical box	2
	Large animal surgical box	1
	Post mortem box	2
4	**Diagnostic laboratories**	
	Haemo-analyzer	1
	Electrolyte Analyzer	1
	Chemical Analyzer	1
	Genotype machine	1

	Deep Freezer	1
	Refrigerator	1
	Incubator	4
	Binocular Microscope	2
	Refractometer	3
	Micro-haematocrit	2
	PH meter	4
	Haematospin	1
5	**Radiology Laboratory**	
	X-Ray machine	1
	X-Ray film dryer	1
	X-Ray film illuminator	2
	X-Ray film hanger	10
	X-Ray cabinet	1
	Dark room	1
	Endoscope cold light source	1
	Gastro scope	1
	Stabilizer	1
6	**Pharmacy**	
	Drug cabinet	2
	Refrigerator	1

LIST OF EQUIPMENTS IN PATHOLOGY LABORATORY

NECROPSY LABORATORY

S/No	Description	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/N	**Name of Equipment**	**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/N	**Name of Equipment**	Quantity
1	Auto chemistry analyzer	1
2	Auto haemoanalyser	1
3	Table top centrifuge	1
4	Microphaematocrit 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

LIST OF EQUIPMENT IN MICROBIOLGY LABORATORY

S/NO	ITEM/DESCRIPTION	QTY REQUIRED
A.	**BACTERIOLOGICAL EQUIPMENTS**	10
1	Microscope (Binocular)	2
2	Incubator	1
3	Hot Air oven	1
4	Water distiller	2
5	Autoclave	1
6	Weighing balance (electronic)	1
7	Hot plate	1
8	Colony counter	1
9	Refrigerator	1
10	Deep freezer	1
11	Anaerobic jar	1

B.	**VIROLOGY EQUIPMENTS**	1
1	Egg Candler	1
2	Co2 incubator	1
3	Well washer	1
4	Incubator shaker	1
5	Vice & clamp	1
6	Refrigerated centrifuge	1
7	ELISA Reader	1
8	Biosafety cabinet (CLASS II)	1
9	Trough	1
10	Tiles	1
11	Revco (-8^0c)	1
12	Liquid Nitrogen Jar	1
13	Centrifuge	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	C02 Incubator	1
7	Dissecting microscope	1
8	Hot Air Oven	1
9	Incubator shaker	1
10	PH Meter	1
11	Water bath	1

TEAM LIST

ND/HND VETERINARY LABORATORY TECHNOLOGY

S/NO.	PARTICIPANT NAME AND ADRESS
1	Prof. S. O. Shoyinka University of Nigeria, Nsukka
2	Dr. John Garba Veterinary Council of Nigeria (VCN), Abuja
3	Prof. J. B. Adeyanju University of Ilorin
4	Prof. G. H. Sharubutu Fed. Coll. Of Animal Health and Production Technology, Vom
5	Dr. C. Bot Fed. Coll. Of Animal Health and Production Technology, Vom
6	Prof. M. D. Salihu College of Agriculture, Lafia
7	Prof. G. M. Agaie Usman Danfodiyo University, Sokoto
	NBTE Staff
8	Helen Oduntan
9	Dr.Rufai Ibrahim
10	Mrs. Kubura D. Jauro
11	Nsan Nsan Tiku