

**UNIVERSITY OF NIGERIA, NSUKKA**  
**FACULTY OF VETERINARY MEDICINE**  
**DEPARTMENT OF VETERINARY PATHOLOGY & MICROBIOLOGY**  
**POSTGRADUATE PROGRAMMES**

**PHILOSOPHY**

In keeping with the philosophy of the University of Nigeria, the programmes emphasize the production of graduates with appropriate professional and personal attitudes and behaviour, commitment, responsibility and leadership drive for excellence and; who are comprehensively prepared and innovative with profound knowledge and understanding of abnormalities, practical skills of aetiology, pathogenesis and diagnosis and control of animal diseases.

**OBJECTIVES**

The programmes are designed to equip the students with the theoretical and practical tools required to function efficiently and successfully as veterinary pathologists and microbiologists. The students are exposed to in-depth and up-to-date knowledge of the areas of pathology, bacteriology, virology, mycology and immunology, with emphasis on safeguarding animal health and their relationships with the promotion of human health.

**SCOPE**

The Department of Veterinary Pathology and Microbiology offers facilities for both Full/Part time studies for the degrees of M.Sc. and Ph.D. The M.Sc. programme involves coursework and research to be presented in a project report. Postgraduate research is carried out in the student's chosen area of specialization. The degree of Doctor of Philosophy (Ph.D) is pursued by comprehensive research to be embodied in a thesis. Postgraduate research is carried out in the student's chosen area of specialization.

**ADMISSION REQUIREMENTS**

**M.Sc Programme**

The following shall qualify for the Master's degree admission:

Graduates of the University of Nigeria or of other recognized universities who have obtained a Doctor of Veterinary Medicine (DVM) degree.

**Ph.D Programme**

Candidate must possess a good Master's degree in Pathology or Microbiology from the University of Nigeria, Nsukka or a recognized university, with a minimum CGPA of 3.0/4.0 or 3.5/5.0 or 60%.

## **AREAS OF SPECIALIZATION**

The following are the areas of specialization available in the Department:

- (a) Veterinary Pathology with sub-specialization in:
  - i. Diagnostic (Anatomic) Pathology
  - ii. Clinical Pathology (Haematology and Clinical Chemistry)
  - iii. Avian Pathology
  - iv. Nutritional Pathology
  
- (b) Veterinary Microbiology with sub-specialization in:
  - i. Bacteriology
  - ii. Virology
  - iii. Mycology
  - iv. Mycoplasma & Rickettsiology
  - v. Immunology

## **DURATION OF PROGRAMMES**

### **M.Sc**

Full-Time: A minimum of 3 Semesters  
A maximum of 5 Semesters

Part-Time: A minimum of 5 Semesters  
A maximum of 8 Semesters

### **PhD**

Full-Time: A minimum of 6 Semesters  
A maximum of 10 Semesters

Part-Time: A minimum of 8 Semesters  
A maximum of 12 Semesters

## **REQUIREMENTS FOR GRADUATION**

### **M.Sc Programme**

- I) To be awarded the M.Sc degree a student must have taken and passed the following:
  - (i) Four compulsory faculty-based courses with a total credit unit load of 14.
  - (ii) One compulsory Postgraduate course (PGC 601 - Research Methodology and application of ICT in Research) (3 credit units).
  - (iii) Other departmental courses as recommended for the student by the Supervisor/Department based on the student's area of specialization which must constitute a minimum of 16 units.

The compulsory and required courses must be selected from the approved list.

- II) In all cases, M.Sc students must write and submit to the department a Project Report duly supervised by an approved higher degree supervisor whose qualifications are not below the Ph.D. Such a Project Report must be sent to an external examiner nominated by the department and appointed by Senate for that purpose.

### **Ph.D. Programme**

To graduate, all PhD students must register, take and pass the following faculty-based courses totaling 30 credit units plus the Postgraduate School based course, Synopsis and Grant Writing (3 credit units).

Every Ph.D. candidate must submit a thesis on a chosen and approved topic, supervised by an approved supervisor whose qualification is not below the Ph.D, and who is not lower than Senior Lecturer in rank. The supervisor must have the approval of the University senate.

The Ph.D. thesis must be defended before an external examiner duly nominated for that purpose and appointed by Senate.

### **LIST OF APPROVED SUPERVISORS**

#### **Professors/ Readers**

1. S. V. O. Shoyinka, DVM, M.Sc., Ph.D, FCVSN (Veterinary Pathology - Diagnostic (Anatomic) Pathology).
2. K. F. Chah, DVM, M.Sc., Ph.D, FCVSN (Veterinary Microbiology – Bacteriology & Mycology).
3. J. I. Ihedioha, DVM, M.Sc., Ph.D, FCVSN (Veterinary Pathology - Clinical Pathology).
4. W. S Ezema, DVM, M.Sc., Ph.D, FCVSN (Veterinary Pathology - Avian Pathology).
5. E. C. Okwor, DVM, M.Sc., Ph.D, FCVSN (Veterinary Microbiology – Virology)

#### **Senior Lecturers**

1. I. C. Ugwu, DVM, M.Sc., Ph.D, FCVSN (Veterinary Microbiology - Bacteriology).
2. C. U. Chukwudi, DVM, Ph.D (Veterinary Pathology).
3. A. C. Mgbeahurike, DVM, M. Sc., Ph.D (Mycology)
4. D. C. Eze, DVM, M. Sc., Ph.D (Veterinary Microbiology – Immunology)

### **JOB OPPORTUNITIES**

Graduates of the Department have job opportunities in the following areas:

- i) Universities and other institutions of learning as lecturers and or research staff,
- ii) Research Institutes: as research officers,
- iii) Federal/State ministries: as Consultant Pathologists and Microbiologists,
- iv) Private Establishments: Farms/ranches, drug companies
- v) Corporate Organizations: Agric Banks, Oil Companies
- vi) Self-employment: Establishment of Private research/diagnostic laboratories
- vii) Government Forces: Police, Army, Customs, Immigration

**COURSE CODES, TITLES AND UNITS FOR THE MASTERS DEGREE PROGRAMME**

**Compulsory Faculty-based Courses for the MSc Programme**

**First Semester**

<u>Course No.</u>	<u>Title</u>	<u>Units</u>
FVM 701	Research Methods and Scientific Writing	3

**Second Semester**

<u>Course No.</u>	<u>Title</u>	<u>Units</u>
FVM 702	Biometrics and Computer Applications	3
FVM 796	Research Project Final Seminar	2
FVM 790	Research Project	6
<b>Total -</b>		<b>14 units</b>

**Compulsory Postgraduate course**

<u>Course No.</u>	<u>Title</u>	<u>Units</u>
PGC 601	Research Methodology and application of ICT in Research	3 units

**Departmental Courses for M.Sc. Programme in Veterinary Pathology**

<u>Course No.</u>	<u>Title</u>	<u>Units</u>
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First Semester:

VPM 711	Correlative Veterinary Pathology	2
VPM 713	Advanced Veterinary Haematology & Diagnostic Cytology	2
VPM 715	Advanced Systemic Veterinary Pathology	2
VPM 717	Advanced Special Veterinary pathology	2
VPM 719	Histopathologic Technique	2
VPM 721	Oncology	2
VPM 723	Immunopathology	2

Second Semester:

VPM 710	Advanced Clinical Chemistry	2
VPM 712	Advanced Histopathology	2
VPM 714	Nutritional Pathology	2
VPM 716	Toxicological Pathology	2
VPM 718	Avian Pathology	3
VPM 720	Histochemistry and Immunohistochemistry	2

**Departmental Courses for M.Sc. Programme in Veterinary Microbiology**

<u>Course No.</u>	<u>Title</u>	<u>Units</u>
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First Semester

VPM 724	Advanced Bacteriology	3
VPM 726	Advanced Virology	3
VPM 728	Advanced Mycology	2
VPM 730	Advanced Immunology	2
VPM 732	Microbial Chemistry	2
VPM 734	Microbial Genetics and Biotechnology	3

## Second Semester:

VPM 725	Mycoplasmaology & Rickettsiology	2
VPM 727	Viral Immunology	2
VPM 729	Laboratory Techniques in Veterinary Microbiology	3
VPM 731	Diagnostic methods in Molecular Biology	2
VPM 733	Advanced Techniques in Diagnostic microscopy	2
VPM 735	Special Problems in Veterinary Microbiology	2

## **COURSE CODES, TITLES AND UNITS FOR THE Ph.D. DEGREE PROGRAMME**

<u>Course No.</u>	<u>Title</u>	<u>Units</u>
FVM 895	Ph.D Research Project Proposal Seminar	2
FVM 896	Ph.D Research Project Progress Report Seminar	2
FVM 897	Ph.D Research Project Final Seminar	2
PGC 701	Synopsis and Grant writing	3
FVM 890	Thesis	24
<b>Total -</b>		<b>33 units</b>

## **COURSE DESCRIPTIONS FOR THE MASTER OF SCIENCE PROGRAMME**

### Compulsory Faculty-based Courses

#### **FVM 701      Research Methods and Scientific Writing      [3 units]**

Definitions, value and philosophy of research. Types of studies / research. Choice of research topics. Definition of background of study, statement of problem, research question, objectives and hypotheses. Research design, sampling, sourcing, collation and analysis of data. Presentation and interpretation of results. Technical report writing. Critique of published papers. Presentation of research findings.

#### **FVM 702      Biometrics and Computer Applications      [3 units]**

Definitions and value of biometry in scientific research. Variability and normal distribution. Probability, binomial and Poisson distributions. Populations and sampling. Testing differences between means. Students t-test. Chi – square. Correlation and Regression analysis. Analysis of variance. Other relevant statistics. Basics of computer appreciation. Software packages relevant to scientific and veterinary medical research and their use. Presentation of scientific reports.

#### **FVM 796      Research Project Final Seminar      [2 units]**

Final seminar on M.Sc. research project highlighting background of the study, statement of problem, objectives of the study, methods used in carrying out the study and analysis of the data generated, results, discussion of the results and recommendations arising from the findings of the study.

#### **FVM 790      Research Project      [6 units]**

Research project in the student's area of study, leading to a Project Report that shall be examined by an External Examiner.

## **Compulsory Postgraduate course**

### **PGC 601      Research Methodology and application of ICT in Research [3 units]**

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study area from African and Western perspectives. Major steps in research: selection of problem, literature, literature review, Design, Data collection, analysis and interpretation, Conclusions. Study of various research designs, Historical, Case studies, Surveys, Descriptive, cross sectional, Experimental etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis and result presentation. Essentials of spreadsheets, internet technology, and internet search engines. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

### **Veterinary Pathology Courses**

#### **VPM 711      Correlative Veterinary Pathology                      [2 units]**

an independent necropsy, histo-pathological case analysis and presentation in the form of seminars and/or discussions. Strong emphasis is placed on necropsy of animals and diagnosis of lesions in biopsy specimens, classification of neoplasm and review of selected cases from the departmental archive.

#### **VPM 710      Advanced Veterinary Clinical Chemistry                      [3 units]**

Concepts in assay of biochemical of diagnostic importance in blood/serum, urine and other body fluids. Normality, electrolyte acid base balance. Carbohydrate, lipid, protein and mineral metabolism and abnormalities in health and disease. Evaluation of liver, kidney, pancreatic, gastrointestinal and endocrine functions as diagnostic indices. Comparative study of biochemical of diagnostic importance in the different animal species. Advances in the area of clinical chemistry methods, molecular diagnostic techniques, acute phase proteins in disease and special focus on clinical chemistry changes associated with certain diseases.

#### **VPM 712      Advanced Histopathology                      [2 units]**

Detailed study of selected histological sections of pathological lesions from known and unknown diseases/conditions. Designed to strengthen the student's skill in observation and description of microscopic lesions and making histopathologic diagnosis.

#### **VPM 713      Advanced Veterinary Haematology & Diagnostic Cytology                      [2 units]**

An in-depth course dealing with blood and bone marrow cellular elements. Evaluation of the erythron. Leukocyte morphology and numerical changes in health and disease. Platelet structure, function and numerical changes in health and disease. Artifactual changes in haematology profile and its significance in diagnostic pathology. Species variations in blood cellular elements and reactions in disease – special focus on avian and reptilian haematology. Blood coagulation defects.

**VPM 714 Nutritional Pathology [2 units]**  
Pathologic changes (anatomic and clinical) associated with carbohydrate, protein, fat, mineral and vitamin deficiencies, excesses (toxicities) and imbalances. In depth, macroscopic, microscopic and clinical studies of metabolic changes associated induced by faulty nutrition in animals.

**VPM 715 Advanced Systemic Veterinary Pathology [2 units]**  
Pathologic reactions of the body systems in disease, and on the pathogenesis of their diseases. Emphasis will be on the pathogenesis and anatomic pathology of the different body systems in disease and correlated interpretative clinical pathology where appropriate.

**VPM 716 Toxicological Pathology [2 units]**  
Pathologic reactions of body tissues to toxic injury. Standard methods for the assessment of acute, sub-acute, sub-chronic and chronic toxicity. Use of laboratory animals for toxicopathology studies. Common chemical toxicants, toxic plants and drugs, and documented pathologic changes associated with exposure of animals to them. Standard methods for assay of toxic chemicals in animal tissues and body fluids.

**VPM 717 Advanced Special Veterinary Pathology [2 units]**  
Pathologic changes associated with bacterial, viral, rickettsial, fungal, parasitic and protozoal diseases. Emphasis will be on the pathogenesis, gross and histopathologic lesions, and clinical pathological findings associated with such diseases, and their diagnostic importance.

**VPM 718 Avian Pathology [3 units]**  
Pathology reactions associated with infectious and non-infectious diseases of domestic and wild birds with emphasis on gross and histopathologic examinations. Special focus on diseases of economic importance in poultry production in the tropics and Nigeria specifically.

**VPM 719 Histopathology Technique [2 units]**  
Standard procedures in collection, preservation and storage of pathology specimens. Processing, staining and examination of specimens including microtomy. Use of special staining techniques.

**VPM 720 Histochemistry Immunohistochemistry [2 units]**  
Examination of the theory and practice of available histochemical and immunohistochemical techniques as applied to pathological material with special reference to tissue enzymes. Use of histochemistry/immunohistochemistry in diagnosis.

**VPM 721 Oncology [2 units]**  
General survey of types of common tumours of domestic animals. Initiation, progression and pathogenesis of cancerous tissue reactions. Gross and histologic identification and differentiation of tumours. Tumour markers and their diagnostic importance.

**VPM 723 Immunopathology [2 units]**  
Immunologic reactions which can cause tissue injury. Tissue manifestations of such reactions. Types and studied of these pathologic changes in some diseases.

## **Veterinary Microbiology Courses**

### **VPM 724      Advanced Bacteriology**

**[3 units]**

Recent advances in the mechanisms of bacterial pathogenesis and molecular biology. Taxonomy and classification of bacteria of veterinary and medical importance; their identification and diagnosis, antigenic characters, pathogenicity and toxinogenicity. Clinical significance of various gram positive and gram negative bacterial organisms that induce diseases in animals and man.

### **VPM 725      Mycoplasmaology and Rickettsiology**

**[2 units]**

Mycoplasmas and rickettsias associated with disease conditions in animals will be studied with emphasis on identification, culture, diseases produced and susceptibility to antimicrobial agent. The diagnostic techniques will also be highlighted.

### **VPM 726      Advanced Virology**

**[3 units]**

Detailed discussion on mammalian viruses; their characteristics, structure, taxonomy, replication, cultivation, antigenicity, pathogenesis, transmission and natural host. Epidemiology of viral diseases. Viruses, viroids, and prions of veterinary and medical importance.

### **VPM 727      Viral Immunology**

**[2 units]**

Basis and principles of antigen antibody reactions in viral infections of livestock, interferon production and its role in modifying viral infections of livestock; methods employed in antigenic analysis of viruses as applied in virus isolation.

### **VPM 728      Advanced Mycology**

**[2 units]**

Basis and principles of taxonomy of pathogenic fungi, yeasts and dermatophytes responsible for superficial and deep infections in animals and man, pathogenesis, toxinogenicity, epidemiology and transmission.

### **VPM 729      Laboratory Techniques in Microbiology**

**[3 units]**

General principles and techniques employed in laboratory study of pathogenic microorganisms (bacteria, virus, etc.); principles and methods sterilization; preparation of media, buffers, reagents; estimation of bacteria numbers; antimicrobial sensitivity; biochemical tests; serological and biological techniques, including use of laboratory animals, tissue cultures, and chicken embryos in isolation and identification of bacteria, viruses. Procurement and treatment of tissues and organs for culture; properties, composition and preparation of different media used in tissue culture. Detailed procedure and application of tissue culture techniques in diagnostic veterinary virology and viral vaccine production for animals use.

### **VPM 730      Advanced Immunology**

**[2 units]**

Introduction/concepts, types of immunity, antigens and immune responses, immunoglobulines. Mechanisms of specific and non-specific immune responses. Chemical mediators of immune responses, complement systems, lymphoid system, cells of immune system. Antibody mediated allergic reactions, cell mediated immunological reactions. Delayed hypersensitivity reactions. Auto-immune reaction. Immunological tolerance, major histocompatibility complex, gene regulation of immune responses. Oncogenesis and differentiation antigens, immunodeficiencies, immunity to parasitic and microbial infections. Antigen and antibody reactions in *vitro*.



**VPM 731 Diagnostic Methods in Molecular Biology [2 units]**  
Isolation, purification, identification and characterization of DNA of various microbial agent using the methods of Gel electrophoresis, hybridization, polymerase chain reaction, restriction enzyme digestion and other methods.

**VPM 732 Microbial Chemistry [2 units]**  
Chemical composition of micro-organisms. Nature and kinetics of microbial enzymes. Energy generation, use of energy in biosynthesis, synthesis of nucleic acids and proteins. Enzyme and gene regulation. Nature and modes of action of antibiotics and other chemotherapeutic agents, antibacterials bacteriocins, and cytosuppressive drugs, analytical and investigative techniques.

**VPM 733 Advanced Techniques in Diagnostic Microscopy [2 units]**  
Use of electronmicroscope, fluorescent microscope, immunohisto-chemistry, background and phase contrast microscope, microphotography techniques as applied in diagnosis of veterinary diseases.

**VPM 734 Microbial Genetics and Biotechnology [3 units]**  
Introduction to microbial genetics, nucleic acids, genetic codes, gene structure, DNA replication, phage biology, molecular aspect of gene expression, DNA damage and repair, DNA restriction; mutation and their chemical basis, detection and isolation of mutants, recombination, transportation, gene transfer, mapping and sequencing of the genome, Recombinant DNA technology and genetic engineering. Infectious drugs resistance and its significance. Use of bacterial organisms in production of natural bio-available products for medical, industrial and nutritional products for animal and human use.

**VPM 735 Special Problems in Veterinary Microbiology [2 units]**  
General discussion on an emerging problem or topical issue in any area of Microbiology.

#### **COURSE DESCRIPTIONS FOR THE DOCTOR OF PHILOSOPHY PROGRAMME**

**FVM 895 Ph.D Research Project Proposal Seminar [2 units]**  
Seminar on proposed Ph.D research project highlighting background of the study, review of literature on current state of knowledge of the area of research, statement of problem, objectives of the study, proposed methodology and expected output/significance of the study.

**FVM 896 Ph.D Research Project Progress Report Seminar [2 units]**  
Progress report seminar on the Ph.D research project highlighting background of the study, statement of problem, objectives of the study, methods used so far in the study, results generated, challenges encountered, changes if any in the design of the study and general discussion of the future prospects of the study.

**FVM 897 Ph.D Research Project Final Seminar [2 units]**  
Final seminar on the Ph.D research project highlighting background of the study, statement of problem, objectives of the study, methods used in carrying out the study and analysis of the data generated, results, discussion of the results and recommendations arising from the findings of the study.

**FVM 890 Thesis [24 units]**

Doctor of Philosophy research project in the student's area of study, under the guidance of an approved supervisor. The study must be original and the topic comprehensively researched. The output should contribute significantly to the existing body of knowledge in the area of study. The write-up (thesis) shall be examined by an External Examiner.

**PGC 701 Synopsis and grant writing [3 units]**

Identification of types and nature of grant writing; mining of grants application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant application structures and contents and writing of concept notes, detailed project description, budgeting and budget defense. Study of sample grant writings in various forms and writing of mock research and other grants. Identification of University of Nigeria synopsis structure requirements (Introduction, Methodology and Results). Determining the content of each sub-unit of the synopsis. Steps in writing of synopsis from the dissertation/Thesis document. Structural and language issues. Common errors in synopsis writing and strategies for avoiding them. The roles of the student and the supervisor in the production of a synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution based interactive workshop to be organized by the school of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.