

# Veterinary Science - VMP (VMP)

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## **VMP 162/PO 162 Livestock and Poultry Disease Management** (3 credit hours)

Basic principles of disease and disease management in livestock and poultry. Disease prevention through sanitation and vaccination. Diseases of horses, pigs, ruminants, poultry, and disease prevention programs for each species

Requisite: Agricultural Institute Only

## **VMP 401 Poultry Diseases** (4 credit hours)

Concepts of factors contributing to or causing disease, disease cycle, host responses, and general approaches to prevention and control including management and biosecurity methods, immunization, and medication. Recognition, diagnosis, prevention, control, and treatment of economically significant infectious and noninfectious diseases affecting poultry.

*Typically offered in Spring only*

## **VMP 420 Disease of Farm Animals** (3 credit hours)

Pathology of bacterial, viral, parasitic, nutritional, thermal and mechanical disease processes for farm animals. This emphasis practices for prevention and control of each disease.

Prerequisite: Junior standing.

*Typically offered in Spring only*

## **VMP 900 Global Health Research Project** (5 credit hours)

This international elective (Global Health Research Project) will allow students to develop an understanding of methodological approaches and techniques used in global health research, including qualitative field work, quantitative surveys, experimental designs, intervention trials, and program evaluation. This elective will highlight the importance of understanding and addressing global health through multidisciplinary frameworks and collaborations. This elective is a required component of the Certificate in Global Health. Course Coordinator Permission required.

*Typically offered in Summer only*

## **VMP 901 Small Ruminant Medicine** (1 credit hours)

This course will present the key principles involved with management, reproduction and diseases of sheep, goats and camelids. This will include basic information such as recommended nutrition programs to more advanced material such as diagnostic, therapeutic and prophylactic measures necessary to correct, reduce or prevent common diseases. Course restricted to 3rd year veterinary students, unless special permission is granted by course coordinator.

*Typically offered in Fall only*

## **VMP 904 Swine Industry** (1 credit hours)

This course will provide veterinary students with expertise to approach a clinical swine problem and also to understand and analyze different parameters from a swine production. Students will evaluate clinical signs, analyze and understand production records, understand regulations and economic analysis. Students will also learn how to set up clinical trials, to interpret serological and virological results, to perform necropsy and to understand swine reproductive management. Cap Max: 6 students

Restriction: Third Year DVM Students

*Typically offered in Spring only*

## **VMP 906 Bovine Reproduction** (1 credit hours)

Students will gain hands-on experience with bovine rectal palpation, rectal ultrasonography, artificial insemination, and breeding soundness exams.

*Typically offered in Fall and Spring*

## **VMP 907 Cancer Pathogenesis and Diagnosis** (1 credit hours)

This course will enable the student to describe the steps that lead from a normal cell to a fully malignant neoplasm, understand underlying molecular mechanisms, and correlate these mechanisms to relevant treatment options. Students will be able to classify different tumor types and deduce the impact of the neoplasm on the host and host responses. Students will also learn to assess clinical samples to make a relevant clinical diagnosis of tumor type and predicted behavior.

Prerequisite: 3rd year DVM student

*Typically offered in Spring only*

## **VMP 908 Advanced Ruminant Medicine and Surgery** (2 credit hours)

This elective course will be a weekly lecture and lab that covers routine ruminant surgical procedures and advanced medicine techniques to supplement VMP 962 Ruminant Medicine and Surgery.

*Typically offered in Spring only*

## **VMP 909 Veterinary International Elective Experience** (1-2 credit hours)

This course will provide students with practical experience in a foreign country working on a veterinary medicine related project being conducted in that country. Projects may focus on production medicine, occupational, zoological medicine, or basic research. Travel restricted to sites not included on the State Department alert/warning list. See <http://travel.state.gov/content/passports/english/alertswarnings.html> for details.

Corequisite: Current enrollment in DVM program

*Typically offered in Fall and Summer*

## **VMP 910 Infection and Immunity 1** (3 credit hours)

This course is intended to familiarize the student with the pathogenic bacteria and fungi of veterinary importance. The student will learn the properties and cultivation of these microorganisms and receive a general introduction to the diseases they can cause. Primary emphasis will be placed on how the biology of the pathogen influences disease pathogenesis, and microbiological identification of infectious agents. The laboratory exercises will complement the lectures and focus on standard procedures for microbial cultivation and identification.

Prerequisite: Admission to the DVM Curriculum

*Typically offered in Fall only*

## **VMP 911 Global Health Principles** (2 credit hours)

Global Health Principles will examine the complexity of Global Health from a holistic perspective. While one can find a myriad of definitions for global health, global health is a compilation of complex topics that affect all societies. This course will explore the basic and advanced principles of Global health, including a discussion on the differences in country health initiatives, the importance of understanding the social and cultural aspects when implementing global health programs globally, examples of successful global health programs, and emerging threats that may impact the implementation of global health programs. This course will be taught bi-weekly as an elective. It requires a current graduate standing at NCSU or a professional student within the College of Veterinary Medicine.

*Typically offered in Fall and Spring*

**VMP 916 Health Maintenance and Animal Production I** (1 credit hours)

This course is part I of a series with VMP 936 and 956 designed to introduce students to procedures for health maintenance and care of horses and food-producing animals. Students learn how to prevent diseases and promote animal health in laboratories.

*Typically offered in Fall and Spring*

**VMP 920 Infection and Immunity 2** (4 credit hours)

This course is intended to continue the topics introduced in Infection and Immunity 1. Specific bacterial, fungal and viral pathogens will be covered including pathogenesis and strategies used to control infection and/or development of disease. The course will also cover more advanced topics in immunology including the types of hypersensitivities, autoimmunity, immunity in the newborn and fetus, immune deficiencies and vaccination.

Prerequisite: Admission to the DVM Curriculum

*Typically offered in Spring only*

**VMP 921 Problem Solving for Cases in Infectious Diseases and Immunity 1** (2 credit hours)

This course is intended to challenge first-year veterinary students to reach a diagnosis of realistic cases involving either infectious diseases or immune pathology. The first part of the course is an introduction to diagnostic laboratory procedures. The second portion of the course requires the students to develop a list of differential causes to assigned clinical cases, choose a presumptive diagnosis based on available data and ordering of diagnostic tests to confirm the presumptive diagnosis. The individual cases are discussed in a small group format with a faculty facilitator.

Prerequisite: Admission to the DVM Curriculum

*Typically offered in Spring only*

**VMP 930 Infection and Immunity 3** (3 credit hours)

Infection and Immunity 3, VMP93X, is designed to serve as a continuation of Infection and Immunity 1 & 2 (first-year curriculum) for the second-year veterinary student. This course is designed to reinforce principles of infectious disease and immunity introduced in the first year of the DVM curriculum and expand upon specific groups of parasites. This course will cover the diagnosis, treatment and control of major endo and ecto parasites of domesticated animals.

Prerequisite: Admission to the DVM Curriculum

*Typically offered in Fall only*

**VMP 931 Veterinary Pathology I** (3 credit hours)

Introduction to the basic pathologic changes which occur in animal tissues. Developmental processes and resulting morphology observed at gross, cellular, and subcellular level emphasized.

*Typically offered in Fall only*

**VMP 934 Problem Solving for Cases in Infectious Diseases & Immunity 2** (2 credit hours)

This course is intended to challenge first-year veterinary students to reach a diagnosis of realistic cases involving either infectious diseases or immune pathology. The first part of the course is an introduction to diagnostic laboratory procedures. The second portion of the course requires the students to develop a list of differential causes to assigned clinical cases, choose a presumptive diagnosis based on available data and ordering of diagnostic tests to confirm the presumptive diagnosis. The individual cases are discussed in a small group format with a faculty facilitator.

Prerequisite: Admission to the DVM Curriculum

*Typically offered in Fall only*

**VMP 936 Health Maintenance and Animal Production II** (1 credit hours)

This course is part II of a series with VMP 916 and 956 designed to introduce students to procedures for health maintenance and care of horses and food-producing animals. Students learn how to care for animals, prevent diseases, and milk cows in laboratories.

Prerequisite: VMP 916

*Typically offered in Fall and Spring*

**VMP 941 Veterinary Pathology II** (4 credit hours)

Systemic Pathology - A study of specific responses of organ systems to pathogenic influences in animals with emphasis on the effects on the body as a whole.

*Typically offered in Spring only*

**VMP 942 Veterinary Clinical Pathology** (3 credit hours)

Introduction to the mechanisms which produce abnormal physiologic parameters within the animal during illness, with emphasis on the techniques for determining those abnormalities in the living animal.

*Typically offered in Spring only*

**VMP 945 Epidemiology & Public Health** (3 credit hours)

The focus of this course is to construct a foundation for clinical medicine by acquiring a holistic view of disease, exploring optimal preventive medicine strategies while developing a critical thinking skills and quantitative reasoning techniques. The teaching/learning format of the course will include lecture, in-class exercises, discussions and case studies.

Prerequisite: VMP 912, DVM student

*Typically offered in Spring only*

**VMP 956 Health Maintenance and Animal Production III** (1 credit hours)

This course is part III of a series designed to instruct students in procedures for maintaining the health and well-being of horses and food-producing animals. Students learn how to prevent diseases and promote animal production, including production of safe meat and milk.

*Typically offered in Fall only*

**VMP 962 Ruminant Medicine** (3 credit hours)

The principles of medical disorders of ruminants are presented. This includes the cause of the disorders and the diagnostic, therapeutic and prophylactic measures necessary to correct, reduce or prevent these problems.

*Typically offered in Spring only*

**VMP 963 Global Health Methods** (2 credit hours)

This course introduces the methodological approaches and techniques used in global health research, including explanations and examples of what is required for field work, implementing surveillance programs, and experimental designs, including the need for risk analysis, intervention trials, and program evaluation. Students will explore the strengths and weaknesses of each methodology, identifying how best to determine the most appropriate method for specific research questions. The course will take a problem-based approach, emphasizing the interdisciplinary nature of global health research. This course can count toward the Global Health Certificate. It requires a current graduate standing at NCSU or a professional student within the College of Veterinary Medicine.

*Typically offered in Spring only*

**VMP 964 Swine and Poultry Medicine** (2 credit hours)

Lecture series supplemented with projected illustration on the most economically important diseases of poultry and swine. Emphasis is placed on definition of diseases, etiology, characteristics of the disease, and diagnosis. The economics related to occurrence, prevention, treatment, and control are presented.

*Typically offered in Spring only*

**VMP 970 Ruminant Primary Care** (2 credit hours)

This is a two-week block considering health management of ruminant species. During the two-week period, students accompany faculty on visits to farms to deliver health management programs, to investigate health problems, or to consider approaches to enhance productivity. A portion of the course also involves experience in providing individual animal health management and addressing medical/surgical disorders. Available to senior veterinary students.

Prerequisite: VMP 956 or VMP 974 or consent of the instructor

*Typically offered in Fall and Spring*

**VMP 971 Food Animal Diagnostics for Disease Diagnosis, Control, and Population Surveillance** (2 credit hours)

This course intended to instruct food animal veterinary students in: 1) underlying principles of veterinary diagnostic assays, 2) proper collection of samples, 3) effective testing approaches for diagnosis and management of disease, 4) strategies for efficient monitoring of food animal population for infection by specific agent(s), and 5) analysis of data from veterinary diagnostic laboratory tests and optimal use of the results for making production management decisions. Priority given to students in Food Animal Focus area. Students in Mixed Animal Focus Area or special-case Epidemiology Focus Area students can enroll (if space remains) with the approval of Course Coordinator if they meet the criteria states in the above requisites.

Prerequisite: Prior undergraduate coursework, summer work experiences, and/or consistent enrollment and good performance in food animal selectives.

*Typically offered in Fall only*

**VMP 972 Advanced Ruminant Medicine Topics** (2 credit hours)

Senior veterinary students will experience advanced training in ruminant clinical medicine.

*Typically offered in Fall and Spring*

**VMP 973 Special Topics in Epidemiology** (2 credit hours)

The main goal of this course is to provide senior veterinary students with the opportunity for pursuing a focused research topic in the area of veterinary epidemiology and population medicine under the direction of consenting faculty. The exact direction and scope of the topic is agreed upon between the instructor, the student and the course coordinator. The course is offered only by the permission of the participating instructor(s) and the course coordinator. The instructor and the student will work out the type of project, what exact objectives are to be met and how the success of obtaining those objectives will be evaluated. The objectives and methods of evaluation of performance will be negotiated between the veterinary student and the instructor and put into writing in the form of a Plan of Action PRIOR to course permission being granted by the course coordinator.

*Typically offered in Fall and Spring*

**VMP 974 Food Supply Veterinary Medicine** (2 credit hours)

This 2-week course provides exposure to the clinical principles of food supply veterinary medicine. It is primarily intended for individuals who are not in the NCSU-CVM Food Animal Focus Area. Ruminant, swine and poultry faculty provide an overview of the animal industries and production practices, as well as exposure to basic veterinary knowledge and clinical skills. Prerequisites may include consent of instructor.

Prerequisite: Completion of first 3 years of veterinary curriculum; consent of instructor for any enrollment >8.

*Typically offered in Fall only*

**VMP 975 Advanced Topics in Veterinary Anatomic Pathology** (1-6 credit hours)

This is a two-week senior veterinary clinical rotation that provides students with additional, focused experience in veterinary anatomic pathology. Students have the option of rotating through necropsy service and surgical biopsy service for two weeks to gain additional experience in pathology similar to VMP 977, the prerequisite for this course. Students have the option of designing a specialized pathology experience with the guidance of an approved pathology faculty member. Enrollment requires pre-approval by faculty assigned to the course.

Prerequisite: VMP 977

*Typically offered in Fall and Spring*

**VMP 976 Food Animal Pharmacology** (2 credit hours)

This course will outline the basic principles of pharmacology and therapy of the major diseases of ruminants, swine and poultry. Students will be expected to develop a thorough understanding of how properly to use drugs in food animal species and should be able to develop a treatment program for most major livestock diseases. The course will be restricted to students in the food animal and mixed animal focus areas.

Prerequisite: VMB 943; VMP 962; VMP 964

*Typically offered in Fall only*

**VMP 977 Necropsy** (2 credit hours)

The necropsy clinical rotation exposes students to pathology techniques - namely the postmortem examination - and helps hone both observation and medical reasoning skills by obtaining and interpreting postmortem findings and laboratory data. Students will use these skills to develop diagnoses, understand disease processes and address clinical and/or production problems.

Restriction: Students enrolled in the DVM program at NCSU CVM only.

*Typically offered in Fall and Spring*

**VMP 978 Clinical Pathology and Laboratory Medicine** (2 credit hours)

This course provides veterinary students with a practical case-based approach to learning all major aspects of veterinary clinical pathology and laboratory medicine (parasitology, immunology, bacteriology) in a clinical setting. It is restricted to students enrolled in the fourth year of the DVM curriculum.

*Typically offered in Fall and Spring*

**VMP 979 Epidemiology** (2 credit hours)

The main goal is to provide senior veterinary students with the opportunity for pursuing a focused research topic in the area of veterinary epidemiology and population medicine under the direction of consenting faculty. The exact direction and scope of the topic is agreed upon between the instructor, the student and the course coordinator. This course is offered only by the permission of the participating instructor(s) and the course coordinator. The instructor and the student will work out the type of project, what exact objectives are to be met and how the success of obtaining those objectives will be evaluated. The objectives and methods of evaluation of performance will be negotiated between the veterinary student and the instructor and put into writing in the form of a Plan of Action PRIOR to course permission being granted by the course coordinator. No one textbook is required for this course.

*Typically offered in Fall and Spring*

**VMP 982 Poultry Health Management I** (2 credit hours)

Poultry Health Management I is a clinical rotation elective for 4th year veterinary students with an interest in poultry health management or farm animal production. This two-week course is offered 3 times each year. Health management of commercial and non-commercial poultry will be discussed. Basic concepts in poultry welfare, biosecurity, disease monitoring/diagnosis, prevention and treatment will be emphasized. The course will consist of lectures, laboratory and field experiences.

*Typically offered in Fall only*

**VMP 983 Poultry Health Management II** (2 credit hours)

Poultry Health Management II is a clinical rotation elective for 4th year veterinary students with a commitment to pursue a career in poultry health management or food animal production. This two-week course is offered throughout the year and may be repeated with permission of the instructor. The course will consist of laboratory and/or field experiences designed to meet the student's career goals. A list of available externships in poultry health management, which may be applicable for this course can be found on the Association of Avian Pathologists web site: <http://www.aaap.info/index.html>, under Educational Opportunities, Senior Veterinary Student Externships approved by the Kenneth Eskelund Preceptorship Committee. Funds to help pay for travel expenses may be available through the Kenneth Eskelund Preceptorship, see information at the web site listed above.

*Typically offered in Fall and Spring*

**VMP 984 Swine Health Management I** (2 credit hours)

This course will provide senior veterinary students with techniques and expertise to approach a clinical swine problem. Students will evaluate clinical signs, analyze production records, assess facilities and management, institute a diagnostic plan and establish an economically feasible solution to the clinical problem. The outline for this course may vary slightly from year to year but the following topics will be covered: Necropsy procedures/sample techniques; Interpreting serologic/virologic results; Farm visits - review building/equipment designs; Practical swine reproductive management; Practical bacteriology; Practical swine nutrition/rations; Swine record systems/Pig Champ.

*Typically offered in Fall only*

**VMP 985 Swine Medicine & Production II** (2 credit hours)

This course will provide senior veterinary students with the opportunity to utilize the techniques and expertise gained in VMP 984. Students will evaluate clinical and production problems on a variety of swine farms. Practicum/field work and independent study will be conducted on commercial swine farms, usually with a veterinary practitioner or faculty member.

*Typically offered in Fall and Spring*

**VMP 986 One Health: From Philosophy to Practice** (2 credit hours)

Graduate/professional seminar (with team project) addressing intersections of veterinary medicine, human medicine, and environmental health. Co-listed at UNC CH Gillings School of Global Public Health and Duke University School of Medicine. Includes participants from these three institutions, plus related private-sector members, non-governmental organizations, and governmental professionals. Its purpose is to facilitate understanding of one health as a system of systems, and promote cross-campus and cross-discipline interactions. Weekly evening course held at NC Biotechnology Center, RTP. Limit: 15 students per university. Requires current graduate standing at NCSU or professional student standing within the College of Veterinary Medicine.

*Typically offered in Fall only*

**VMP 987 Ruminant Topics** (2 credit hours)

This two-week elective allows goal-directed educational enrichment in Ruminant Practice under the direction of consenting faculty. Formats include clinical experiences, clinical and applied investigations, etc. Topics and times are arranged by the student and consenting faculty. Available to 3rd and 4th year veterinary students only upon consent of faculty. VMP 970 may be a required prerequisite.

*Typically offered in Fall and Spring*



**VMP 988 Advanced Topics in Clinical Pathology** (2 credit hours)

The goal of the Advanced Topics in Clinical Pathology is to gain further experience in clinical pathology beyond the required prerequisite laboratory medicine rotation VMP978. This senior clinical rotation is designed around the interests and career goals of the student. The focused activities in this rotation are intended to enhance the student's abilities and knowledge within the field of Clinical Pathology. Examples of activities include but are not limited to: 1) self-directed practice in the examination and interpretation of cytology and hematology slides using teaching slides sets; 2) practice describing and interpreting hematology and cytology slides from current clinical cases; 3) interpretation and discussion of complex clinical chemistry cases; 4) development of short research projects; 5) training in flow cytometry and interpretation; and 6) development of educational materials on a topic in clinical pathology.

Prerequisite: VMP 978 (Clinical Pathology, Laboratory Medicine and Nutrition) is a prerequisite course although under special circumstances instructor could permit to take prior to VMP 978 based on student background. Instructor permission is required.

*Typically offered in Fall and Spring*

**VMP 989 Animal Welfare Judging and Assessment** (1 credit hours)

This course will provide veterinary and graduate students with practical skills for animal welfare assessment and evaluations using scientific evidence through peer-reviewed literature. Students will learn general criteria and a scientific approach to assess welfare across multiple species and settings. This course is open to students enrolled in the veterinary professional program. In addition, graduate students wishing to compete in the Intercollegiate Animal Welfare Judging Contest may be enrolled in the course based on instructor discretion. Participation in the Intercollegiate Animal Welfare Judging Contest is not a requirement for this course.

Prerequisites: VMP 916F and VMC 927. VMC 927 may be waived with instructor permission

*Typically offered in Fall only*

**VMP 990 Extramural Experiences - Large Animal** (2 credit hours)

Senior DVM students will have the opportunity to undertake an elective rotation in an approved practice externship in a large animal practice a) food animal/rural or b) equine/mixed animal. The practice opportunity will meet the need recognized by students, CVM faculty and private practice colleagues alike to increase "hands on" experience in a private practice setting. Private practice experiences are available for year 1 - 3 students through the selective offerings. Presently, senior students have the opportunity to experience private practice by arranging an externship as an elective. However, initiating an elective course will ensure consistency between experiences, with clear expectations to achieve an approved level of learning/skills objectives with verification from the practice. Practitioners will be valuable partners in the education process in the senior year, providing access to individual animal and herd-related clinical diversity that is increasingly difficult to offer in the academic setting.

*Typically offered in Fall and Spring*

**VMP 991 SP Top in PHP** (1 credit hours)

One week special topic course in the Department of Population Health & Pathobiology Department.

**VMP 992 SP Top in PHP** (1-2 credit hours)

One week special topic course in the Department of Population Health & Pathobiology Department.

**VMP 993 Extramural in Epidemiology, Public Health, and Public Policy** (2-6 credit hours)

This course is designed to expand opportunities for senior veterinary students to participate in a 2 week practicum in epidemiology, public health, or public policy under mentorship of experienced State, Federal, or private organization professionals. Students select their area or topic of interest and consult with the Focus Area Leader and submit a short proposal for review. Students work under supervision of an approved professional. Focus Area students may repeat the 2 week experience 3 times for a total of 6 weeks.

*Typically offered in Fall and Spring*

**VMP 994 Extramural Experience in Pathology** (1-4 credit hours)

This is a two-week externship experience in pathology. The student will arrange an extramural experience in an academic, diagnostic, government, industrial, or zoological/wildlife laboratory setting under the supervision of a board certified veterinary anatomical or clinical pathologist. Fourth year DVM students only.

*Typically offered in Fall and Spring*

**VMP 996 Ruminant Medicine and Surgery Clinical Rotation** (2 credit hours)

This is a two-week block focused on medicine and surgery of the ruminant species. During the two-week period, students will stay at the veterinary school, working with the clinicians and house officers on outpatient and inpatient appointments. This two-week block will involve in-clinic experience, focusing on individual animal health management and addressing medical/surgical disorders. Available to senior veterinary students.

*Typically offered in Fall, Spring, and Summer*

**VMP 998 Introduction to Farm Management for Veterinarians** (2 credit hours)

This course is an introduction to different aspects of modern beef and dairy farm management. A combination of classroom instruction and practical application, the course will provide future veterinarians with knowledge and skills needed to help producers make informed animal health, production and financial decisions. NCSU CVM Teaching Animal Unit, NCSU Dairy Education Unit, and NCSU Beef Education Unit farms will be used as models for observation and evaluation.

*Typically offered in Fall and Spring*

**VMP 999 Extramural in Vet International Programs** (2 credit hours)

This course will provide students with practical experience in a foreign country working on a veterinary medicine related project being conducted in that country. Projects may focus on production medicine, occupational safety, zoological medicine, or basic research.

*Typically offered in Fall and Spring*