VETERINARY DIAGNOSTIC AND PRODUCTION ANIMAL MEDICINE

Professional Program of Study

For the professional curriculum in veterinary medicine leading to the degree doctor of veterinary medicine, see Veterinary Medicine, Curriculum (http://catalog.iastate.edu/collegeofveterinarymedicine/#curriculuminveterinarymedicine).

Courses in veterinary diagnostic and production animal medicine provide students with basic and advanced skills in diagnostics, reproduction, medicine, surgery, production, welfare, and health management of the major livestock species. Students in the fourth year of the curriculum in veterinary medicine may elect to take advanced courses in beef, dairy, swine, poultry or small ruminant production medicine. Elective courses may include preceptorships in private practices, at other veterinary schools, in research and disease control laboratories, or in related agribusinesses.

Production animal medicine emphasizes the integration of veterinary medicine with nutrition, genetics, economics, food safety, and other disciplines, enabling graduates to acquire and use a broad knowledge base to support the health and improve the production and efficiency of the food supply chain.

Graduate Study in Veterinary Preventive Medicine

Veterinary Preventive Medicine is a multidisciplinary program focused on the study of health and disease in populations. The various disciplines represented in the program are unified by a common approach based on the application of epidemiological methods to problem solving in populations. Through their research and course work, students will learn to understand and apply a variety of disciplines, principles, and techniques to population health issues involving environmental, ecological, nutritional, genetic, infectious, or non-infectious diseases.

Graduate study in Veterinary Preventive Medicine will provide valuable skills and experience to persons interested in public health, food safety, emerging infectious diseases, zoo or wildlife health, and livestock health. A degree in Veterinary Preventive Medicine may be valuable for individuals considering a future in the biological or pharmaceutical industries, government regulatory agencies, public veterinary practice, international service agencies responsible for population health or progressive private practice.

Veterinary Preventive Medicine is an interdepartmental major administered by the Department of Veterinary Diagnostic and Production Animal Medicine (VDPAM) with participating faculty from colleges and departments across the University and collaborators from the National Animal Disease Center (USDA:ARS) and the National Veterinary Services Laboratories (USDA:APHIS) located in Ames, Iowa.

Both thesis and non-thesis options are available and require the completion of a minimum of 30 graduate credits for thesis and 36 graduate credits for non-thesis and a final examination.

Program of Study: Master of Science in Veterinary Preventive Medicine (Thesis Option) 30 credits

STAT 5870	Statistical Methods for Research Workers	4
VDPAM 5270	Applied Statistical Methods in Population Studies	3
VDPAM 5280	Principles of Epidemiology and Population Health	3
VDPAM 5290	Epidemiological Methods in Population Research	3
VDPAM 6990	Research	1-30
Research or Electives to total at least 17 additional credits		

Program of Study: Master of Science in Veterinary Preventive Medicine (Non-Thesis Option) 36 Credits

STAT 5870	Statistical Methods for Research Workers	4
VDPAM 5270	Applied Statistical Methods in Population Studies	3
VDPAM 5280	Principles of Epidemiology and Population Health	3
VDPAM 5290	Epidemiological Methods in Population Research	3
VDPAM 5900	Special Topics	1-3
One Additional STAT course from the following		3
STAT 5710	Introduction to Experimental Design	
STAT 5730	Introduction to Survey Sampling	
STAT 5750	Introduction to Multivariate Data Analysis	
VDPAM 5990	Creative Component	
Creative Component and Electives to total 18 additional credits		

Graduate Certificate in Veterinary Preventive Medicine

Veterinary Diagnostic and Production Animal Medicine offers a graduate certificate for DVMs, concurrent DVM students and non-DVMs in allied animal industries in Veterinary Preventive Medicine.

Students in this program are able to select courses that focus in areas of animal welfare, diagnostics, food safety, evidence-based medicine, surgery, pathology, microbiology, epidemiology, public health, statistics and production medicine.

The purpose of the graduate certificate in Veterinary Preventive Medicine for industry professionals is to address the continued and advanced needs of animal health professionals. The certificate enables professionals to gain recognition for a skill set that includes epidemiology, risk assessment, production medicine and animal welfare.

A graduate certificate may be used to increase knowledge in a new or emerging area of interest to the candidate. As such, it may be used to formally gain recognition for retraining to meet the needs of today's food production systems.

The graduate certificate for concurrent DVM students is designed to give additional skills to students planning on working with populations of animals. Using a combination of on-line and dual listed graduate level courses, the program is designed to enable DVM students to complete the certificate while studying for their DVM degree. Students enrolled in any US-based DVM program are able to complete a graduate certificate at ISU using a combination of on-line and transfer graduate level courses.

The graduate certificate is an additional qualification awarded by Iowa State University after successful completion of 15 graduate level credits. A graduate certificate is different from continuing education as the certificate includes an academic transcript from Iowa State University. Students complete the same courses graduate students do with the the same expectations for all assignments and exams.

The program is available as a strictly on-line (off campus) delivery method or as a combination of classroom-based and on-line course offerings providing maximum flexibility in scheduling.

Program of Study: Graduate Certificate in Veterinary Preventive Medicine (15 credits)

Certificate required core courses		7
STAT 5870	Statistical Methods for Research Workers	
VDPAM 5280	Principles of Epidemiology and Population Health	
Remaining 3 core credits can be selected from		3
VDPAM 5270	Applied Statistical Methods in Population Studies	
VDPAM 5290	Epidemiological Methods in Population Research	
VDPAM 5700	Risk Assessment for Food, Agriculture and Veterinary Medicine	
5 elective credits from any approved ISU graduate course		5
Total Credits		**15**

Courses primarily for professional curriculum students:

VDPAM 4260: Veterinary Toxicology
(Dual-listed with VDPAM 5260/ TOX 5260). (Cross-listed with TOX 4260).
Credits: 3. Contact Hours: Lecture 3.
Study of toxicological diseases of animals emphasizing clinical recognition, circumstances of poisoning, differential diagnosis with clinical and laboratory data, therapeutic procedures, preventive management and public health implications. Supplemented with case-based materials. (Typically Offered: Spring)

VDPAM 4280: Principles of Epidemiology and Population Health
(Cross-listed with MICRO 4280/ VMPM 4280).
Credits: 3. Contact Hours: Lecture 3.
Epidemiology of disease in populations. Disease causality, observational study design and approaches to epidemiologic investigations. This course is available on campus and by distance. (Typically Offered: Spring)

VDPAM 4870: Livestock Disease Prevention
Credits: 3. Contact Hours: Lecture 3.
The course is designed for both the pre-veterinary and animal science majors who have an interest in production animal health, disease prevention methods, epidemiology of economically important agents, and the ecology of currently important pathogens found in North American livestock industries. It will focus on disease prevention principles for individuals and large production population systems. (Typically Offered: Fall)

VDPAM 4890: Issues in Food Safety
(Cross-listed with ANS 4890/ HSPM 4890/ FSHN 4890).
Credits: 1. Contact Hours: Lecture 1.
Prereq: (Credit or concurrent enrollment in FSHN 1010 *or FSHN 2720 or* HSPM 2330*); (*FSHN 4190 *or* FSHN 4200*);* FSHN 4030
Capstone seminar for the food safety minor. Case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective. (Typically Offered: Spring)

Courses primarily for graduate students, open to qualified undergraduates:

VDPAM 5070: Evidence Based Clinical Decision Making
Credits: 1. Contact Hours: Lecture 1.
Discussion, lectures and laboratories to assess the quality and significance of medical evidence in making informed decisions about the treatment of individual animals and animal populations. (Typically Offered: Spring)

VDPAM 5080: Poultry Diseases
Credits: 2. Contact Hours: Lecture 2.
Discussion, lectures and laboratories to assess the quality and significance of medical evidence in making informed decisions about the treatment of individual animals and animal populations. Offered even-numbered years. (Typically Offered: Spring)

VDPAM 5140: Veterinary Practice Entrepreneurship
Credits: 2-3. Contact Hours: Lecture 3.
Formal exposure to the entrepreneurial and business skills necessary to own and operate a successful veterinary practice or other small business opportunity. Personal finance, marketing, human resource management, general accounting, site assessment, location demographics, practice valuation, and a host of other issues which must be considered when purchasing or starting a new business are covered. Class instruction will be delivered by successful practice and business owners with examples from real world experience. (Typically Offered: Spring)

VDPAM 5260: Veterinary Toxicology
(Dual-listed with VDPAM 4260/ TOX 4260). (Cross-listed with TOX 5260).
Credits: 3. Contact Hours: Lecture 3.
Study of toxicological diseases of animals emphasizing clinical recognition, circumstances of poisoning, differential diagnosis with clinical and laboratory data, therapeutic procedures, preventive management and public health implications. Supplemented with case-based materials. (Typically Offered: Spring)

VDPAM 5270: Applied Statistical Methods in Population Studies
Credits: 3. Contact Hours: Lecture 3.
ANOVA, Linear Regression, Model Selection, Mixed Models, ANCOVA, Repeated Measurement Analysis, MANOVA, Nonparametric Methods, Diagnostic Test Evaluation, ROC Curve Alysis, Generalized Linear Models, Logistic Regression, Survival Analysis, Cox Proportional Hazards Regression, Count Data Analyses. This course is available on campus and by distance. Offered odd-numbered years. (Typically Offered: Fall)

VDPAM 5280: Principles of Epidemiology and Population Health
(Cross-listed with VMPM 5280).
Credits: 3. Contact Hours: Lecture 3.
Epidemiology of disease in populations. Disease causality, observational study design and approaches to epidemiologic investigations. This course is available on campus and by distance. (Typically Offered: Spring)

VDPAM 5290: Epidemiological Methods in Population Research
Credits: 3. Contact Hours: Lecture 3.
Train students on selecting the proper statistical model to conduct statistical analysis in the context of epidemiological studies. Train students to report and interpret data collected from experimental (clinical trials), observational (cross-sectional, case-control, cohort) or field-based studies incorporating the information covered in previous epidemiology/ biostatistics courses and this course, and how to communicate the findings with the end-users. Introduce other methods that can be used when analyzing epidemiological studies. This course is available on campus and by distance. Offered even-numbered years. (Typically Offered: Fall)

VDPAM 5420A: Introduction to Molecular Biology Techniques: DNA Techniques
(Cross-listed with BMS 5420A/ EEOB 5420A/ FSHN 5420A/ GDCB 5420A/ HORT 5420A/ NREM 5420A/ NUTRS 5420A/ BBMB 5420A/ VMPM 5420A).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

VDPAM 5420B: Introduction to Molecular Biology Techniques: Protein
(Cross-listed with BMS 5420B/ EEOB 5420B/ FSHN 5420B/ GDCB 5420B/ HORT 5420B/ NREM 5420B/ NUTRS 5420B/ BBMB 5420B).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only. (Typically Offered: Spring, Summer)

VDPAM 5420C: Introduction to Molecular Biology Techniques: Cell Techniques
(Cross-listed with BMS 5420C/ EEOB 5420C/ FSHN 5420C/ GDCB 5420C/ HORT 5420C/ NREM 5420C/ NUTRS 5420C/ VMPM 5420C/ BBMB 5420C).
Credits: 1. Contact Hours: Laboratory 2.
Repeatable.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection.ular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

VDPAM 5420D: Introduction to Molecular Biology Techniques: Plant Transformation
(Cross-listed with BMS 5420D/ EEOB 5420D/ FSHN 5420D/ GDCB 5420D/ HORT 5420D/ NREM 5420D/ NUTRS 5420D/ VMPM 5420D/ BBMB 5420D).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of tranformants. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

VDPAM 5420E: Introduction to Molecular Biology Techniques: Proteomics
(Cross-listed with BMS 5420E/ EEOB 5420E/ FSHN 5420E/ GDCB 5420E/ HORT 5420E/ NREM 5420E/ NUTRS 5420E/ VMPM 5420E/ BBMB 5420E).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

VDPAM 5420F: Introduction to Molecular Biology Techniques: Metabolomics
(Cross-listed with BMS 5420F/ EEOB 5420F/ FSHN 5420F/ GDCB 5420F/ HORT 5420F/ NREM 5420F/ NUTRS 5420F/ VMPM 5420F/ BBMB 5420F).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

VDPAM 5420G: Introduction to Molecular Biology Techniques: Genomic
(Cross-listed with BMS 5420G/ EEOB 5420G/ FSHN 5420G/ GDCB 5420G/ HORT 5420G/ NREM 5420G/ NUTRS 5420G/ VMPM 5420G/ BBMB 5420G).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

VDPAM 5460: Clinical and Diagnostic Toxicology
(Cross-listed with TOX 5460).
Credits: 1-3. Contact Hours: Laboratory 3.
Repeatable.
Advanced study of current problems and issues in veterinary toxicology. Emphasis on problem solving and interpreting clinical cases while utilizing clinical, epidemiological, and laboratory resources. Course consists highly of clinical case based material. (Typically Offered: Fall, Spring, Summer)

VDPAM 5510: Advanced Veterinary Diagnostic Pathology
Credits: 1-3. Contact Hours: Laboratory 3.
Repeatable.
Laboratory diagnosis of animal diseases with emphasis on gross and microscopic lesion description. Caseload is focused heavily on infectious diseases of food animals. (Typically Offered: Fall, Spring, Summer)

VDPAM 5600: Ecology of Infectious Diseases
Credits: 3. Contact Hours: Lecture 3.
Topics of applied ecology of infectious diseases. Specific objectives include: a) understanding dynamics of pathogen transmission within and between population; b) how to reduce risk of pathogen introduction in populations; c) how to early detect pathogens and classify herds according to disease status; d) how to quantify pathogen transmission and impact in animal populations; e) applying and measure the effect of interventions to manipulate disease transmission dynamics within and between populations. Develop skills to prevent, detect and/or significantly control/eliminate animal health issues from animal populations. Learn how to quantify health issues and estimate the value of interventions to influence and mitigate health problems. Offered odd-numbered years. (Typically Offered: Spring)

VDPAM 5620X: Applied Diagnostic Technologies and Medicine for Infectious Disease
Credits: 3. Contact Hours: Lecture 3.
Repeatable.
Veterinary diagnostics and diagnostic medicine for infectious diseases in animal populations, mostly livestock, and clinical applications. Specific objectives include: understanding diagnostic process; mechanics of laboratory diagnostic methods; test development and validation; optimizing diagnostic outcomes; and applying diagnostic data to disease investigation and/or intervention. Additionally, students are expected to present a diagnostic relevant subject and participate in case review and discussion. On-line and can be asynchronous from time to time. Offered even-numbered years. (Typically Offered: Fall)

VDPAM 5640: Animal Welfare Science and Research
Credits: 3. Contact Hours: Lecture 2, Discussion 1.
Animal welfare is increasingly a key component of societal decisions about animal use, sustainable development and human-animal relationships. Understanding animal welfare as a scientific discipline, with primary focus on veterinary, biomedical and animal science disciplines. Explore fundamental and applied approaches to animal welfare science, including experimental design, data analysis and interpretation of results. Topics selected will reflect student interests, and may include animal welfare assessment and assurance, animal cognition, pain assessment and mitigation, and animal models used in biomedical research. Offered even-numbered years. (Typically Offered: Spring)

VDPAM 5670X: Design, Implementation and Analysis of Field Studies in Food Animals
Credits: 3. Contact Hours: Lecture 3.
Design of field trials to test hypotheses related to biological outcomes in food animal production. Topics include field trial designs and how-to implement these trials under field/commercial conditions; and how to calculate sample size given different type of outcomes and covers the proper statistical analyses, interpretation, and communication of the results. Invited speakers will share how they use field trials in their daily practice. Case studies. (Typically Offered: Fall)

VDPAM 5700: Risk Assessment for Food, Agriculture and Veterinary Medicine
(Cross-listed with TOX 5700/ AGRON 5700).
Credits: 3. Contact Hours: Lecture 3.
Risk assessment principles as applied to biological systems. Exposure and effects characterization in human and animal health and ecological risk assessment. Risk analysis frameworks and regulatory decision-making. Introduction to quantitative methods for risk assessment using epidemiological and distributional analysis. Uncertainty analysis. Offered odd-numbered years. (Typically Offered: Fall)

VDPAM 5810: Advanced Cow/Calf Production Medicine
Credits: 2. Contact Hours: Lecture 1.5, Laboratory 1.5.
Two-week senior elective that will focus on the economics of animal disease in cow/calf operations. Evidence based medicine and epidemiological principles will be used in investigation of disease outbreaks. Extensive partial budgeting used. Students will complete at least two disease investigations involving outbreaks in commercial cow/calf operations and communicate their findings to the class, the herd owner, and local practitioner. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Spring)

VDPAM 5900: Special Topics
Credits: 1-3. Repeatable.
Prereq: Instructor Permission for Course
Topics in medicine, surgery, theriogenology; beef, swine, dairy, or sheep production medicine. (Typically Offered: Fall, Spring, Summer)

VDPAM 5960: International Experience
Credits: 1-12. Repeatable.
International Preceptorship. (Typically Offered: Fall, Spring, Summer)

VDPAM 5990: Creative Component
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

Courses for graduate students:

VDPAM 6500: Swine Diagnostic Medicine
Credits: 4. Contact Hours: Lecture 4.
A detailed study of swine diseases emphasizing the pathogenesis and diagnosis of swine respiratory, enteric, reproduction, metabolic, and septicemic diseases. Course activities include interpretation of diagnostic case reports and development of diagnostic plans for specific disease objectives. (Typically Offered: Fall)

VDPAM 6540: Comparative Antimicrobial Clinical Pharmacology
Credits: 2. Contact Hours: Lecture 2.
Initial antimicrobial selection for infectious diseases of domestic animals. The antimicrobial drug groups will be examined, stressing pharmacokinetics, minimal inhibitory concentrations, and the use of these parameters to select appropriate compounds and dosages for maximum efficacy. Offered odd-numbered years. (Typically Offered: Fall)

VDPAM 6550: Advanced Swine Production Medicine
Credits: 4. Contact Hours: Lecture 4.
Detailed overview of applied techniques used in swine production medicine; production modeling and record analysis, facility design and management, analysis of competing intervention options, design and evaluation of therapeutic and vaccination strategies, quality control procedures and food safety. Course activities include interpretation of diagnostic case reports and development of diagnostic plans for specific disease objectives. Offered odd-numbered years. (Typically Offered: Spring)

VDPAM 6990: Research
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course

Courses primarily for professional curriculum students:

VDPAM 7308: Spanish for Veterinarians
Credits: 2. Contact Hours: Lecture 2.
This course is designed to meet the needs of veterinary students who will practice in an environment in which the use of Spanish for accurate client communication is essential which includes much of our food animal industry in the state of Iowa. This is not a traditional Spanish language course. To be successful, students taking the course should have a basic knowledge of Spanish pronunciation, grammar and syntax. (Typically Offered: Spring)

VDPAM 7309: Introduction to Production Animal Informatics
Credits: 1. Contact Hours: Lecture 1.
The fundamentals of how clinical, diagnostic, production and financial information is obtained and used by production animal operations will be presented. Students will acquire skills to create and use spreadsheets for manipulating and summarizing data. They will also acquire knowledge of where to find inexpensive and readily available resources with information on how to use spreadsheets and other software. Students will also have the opportunity to work with record keeping programs used by food animal operations. (Typically Offered: Spring)

VDPAM 7310: Introduction to Production Medicine
Credits: 2. Contact Hours: Lecture 2.
The role of the veterinarian in the management of animal health and production in populations including evaluation tools in dairy and beef cattle herds, beef feedlots and swine herds will be described. Provides veterinary students with a starting point to understand the principles and techniques that are the basis of food-animal population health diagnosis management programs. Course available on-line, attendance is not required. (Typically Offered: Spring)

VDPAM 7312: Introduction to Animal Welfare
Credits: 1. Contact Hours: Lecture 1.
A continuation of the Veterinarian in Society series. The objective of this course is to develop knowledge of the fundamental principles of animal welfare, in terms of science, ethics and cultural components. (Typically Offered: Spring)

VDPAM 7340: Clinical Foundations
Credits: 1. Contact Hours: Laboratory 2.
One week, hands-on course at Iowa State University; introduction to food supply veterinary medicine covering overviews of major animal agriculture species (beef, dairy, swine, small ruminants, and camelid), production systems, behavior, welfare, handling and restraint, examination techniques, biosecurity, epidemiology and food safety. Students will visit farms owned by Iowa State University and private clients of Food Animal and Camelid Field Services to perform hands-on clinical skills. Attendance is mandatory. Biosecurity: All students must follow current college policies regarding animal contact following foreign travel. Additionally, no swine contact is allowed within 48 hours of the swine farm visit. Required equipment includes coveralls, rubber boots, thermometer and stethoscope. (Typically Offered: Spring)

VDPAM 7351: Bovine Embryo Transfer and Related Technology
Credits: 2. Contact Hours: Lecture 2.
This course will meet for two hours once each week of the Spring Semester. The first hour will be traditional lecture and the second hour will be a combination of student projects, labs and demonstrations of applied clinical procedures. Bovine embryo transfer and closely related topics such as: female reproductive physiology, estrus synchronization, semen sexing and reproductive disease will be emphasized. In addition, several class periods will be devoted to the use of ultrasound for diagnosis of reproductive and non-reproductive conditions. (Typically Offered: Spring)

VDPAM 7365: Animal Welfare Judging and Assessment
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Preparation for competition in the Intercollegiate Animal Welfare Judging Contest. Development of critical appraisal and oral communication skills in regard to animal welfare. Animal behavior, physiology, health and performance parameters, basic husbandry, housing and preventive care will be explored for select farmed, companion and exotic species. Optional field trips. Course is open to Vet Med, Undergraduate and Graduate students. (Typically Offered: Fall)

VDPAM 7402A: Advanced Dairy Production Informatics: Lecture Series
Credits: 2. Contact Hours: Lecture 2.
Advanced coverage of concepts related to collection, manipulation, analysis and reporting of information used by dairy farms and their consultants. Hands on experience with Dairy Comp 3050 and PCDart as well as other dairy management and information software. (Typically Offered: Spring)

VDPAM 7402B: Advanced Dairy Production Informatics: Experience I
Credits: 2. Contact Hours: Lecture 2.
Independent records analysis and reporting of information used by dairy farms and their consultants. Hands on experience with Dairy Comp 3050 and PCDart. (Typically Offered: Fall, Spring)

VDPAM 7402C: Advanced Dairy Production Informatics: Experience II
Credits: 2. Contact Hours: Lecture 2.
Independent records analysis and reporting of information used by dairy farms and their consultants. Hands on experience with Dairy Comp 3050 and PCDart. (Typically Offered: Fall, Spring)

VDPAM 7402D: Advanced Dairy Production Informatics: Experience III
Credits: 2. Contact Hours: Lecture 2.
Independent records analysis and reporting of information used by dairy farms and their consultants. Hands on experience with Dairy Comp 3050 and PCDart. (Typically Offered: Fall, Spring)

VDPAM 7407: Evidence Based Clinical Decision Making
Credits: 1. Contact Hours: Lecture 1.
Discussion, lectures and laboratories to assess the quality and significance of medical evidence in making informed decisions about the treatment of individual animals and animal populations. (Typically Offered: Spring)

VDPAM 7408: Poultry Diseases
Credits: 2. Contact Hours: Lecture 2.
Bacterial, viral, parasitic, and nutritional diseases of domestic poultry and gamebirds; biosecurity, immunization, and management procedures to prevent poultry diseases. This course includes wet labs. Additional assignments required for graduate level credit. (Typically Offered: Spring)

VDPAM 7409: Veterinary Practice Management and Organization
Credits: 2. Contact Hours: Lecture 2.
An A to Z introduction to proven veterinary practice management methods and strategies. The student will follow a detailed hands-on workbook describing most of the processes and procedures of day to day veterinary practice. Class content will be deliver via online modules. (Typically Offered: Fall)

VDPAM 7414: Veterinary Practice Entrepreneurship
Credits: 2-3. Contact Hours: Lecture 3.
Formal exposure to the entrepreneurial and business skills necessary to own and operate a successful veterinary practice or other small business opportunity. Personal finance, marketing, human resource management, general accounting, site assessment, location demographics, practice valuation, and a host of other issues which must be considered when purchasing or starting a new business are covered. Class instruction will be delivered by successful practice and business owners with examples from real world experience. (Typically Offered: Spring)

VDPAM 7416: Bovine Reproduction Evaluation Laboratory
Credits: 1. Contact Hours: Laboratory 4.
Repeatable.
Bovine rectal palpation techniques will be repetitively taught in 7 four-hour sessions. Students will also learn techniques of epidural anesthesia, artificial insemination, pregnancy staging and ultrasonic imaging. University-owned cattle will be used. Spring semester only offered one section. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring)

VDPAM 7419: Advanced Swine Production Informatics
Credits: 1. Contact Hours: Lecture 1.
Advanced coverage of concepts related to the collection, manipulation, analysis, and reporting of information used by swine production companies. A quick review of modern swine production and measures of productivity ensures students have a firm base for applying the informatics. This course introduces students to one of the most commonly used swine record-keeping systems in the industry and gives them access to actual production data with which to work. Students then learn how to generate and interpret regularly used reports and will use pivot tables and budgeting models in Excel. The importance of data entry and validation and how to transform data into useful knowledge are then addressed. Fundamentals of financial information, cost-benefit analysis and using budgeting models to assess the economics of animal health interventions are then applied. (Typically Offered: Fall)

VDPAM 7420A: Applied Production Animal Medicine Preceptorship: Food Animal Emphasis
Credits: 1-6. Repeatable.
Advanced course in mixed animal production medicine with a food animal emphasis in veterinary practice settings. Requires 40 hours of clinical experience per week. Assignments will be preceptorships with a practicing veterinarian, governmental agency and/or production unit. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7420B: Applied Production Animal Medicine Preceptorship: General Mixed Animal Practice
Credits: 1-6. Repeatable.
Advanced course in production animal medicine in general mixed animal veterinary practice settings. Requires forty hours clinical experience per week. Assignments will be preceptorships with a practicing veterinarian, governmental agency and/or production unit. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7420C: Applied Production Animal Medicine Preceptorship: Government Agency or Food Processing Company
Credits: 1-6. Repeatable.
Advanced course in production animal medicine with emphasis on government agency or food processing company in veterinary practice settings. Forty hours clinical experience per week. Assignments will be preceptorships with a governmental agency and/or production unit. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7420P: Applied Poultry Production Medicine Preceptorship
Credits: 1-6. Repeatable, maximum of 6 credits.
Unique, highly relevant, hands-on veterinary experience for participating students. Development of poultry-specific practice skill sets. Documented experience that is highly valued by future poultry employers. Enhanced cultural and professional awareness for participating students through interaction with active poultry practitioners. Exposure to diverse poultry practice and production environments. (Typically Offered: Fall, Spring, Summer)

VDPAM 7421A: Great Plains Veterinary Educational Center: Calving
Credits: 1.
The Calving Elective provides an opportunity to expand knowledge and experience in all phases of calving management. The program is structured around normal calving operations at USMARC including emergency duties. Activities that take place during the Calving Elective including the diagnosis, treatment, and management of many commonly encountered conditions in the dam and calf, necropsies, and daily discussions. Participation in a caesarian section is not guaranteed. Student must be able to provide own transportation to each site. (Typically Offered: Spring)

VDPAM 7421B: Great Plains Veterinary Educational Center: Bull Breeding Soundness
Credits: 1.
The Bull Breeding Soundness Examination Elective involves training in all phases of the bull fertility examination as recommended by the Society for Theriogenology. Chuteside, hand-on experience is the primary training technique for this elective with informal discussions held during the performance of breeding soundness examinations on 350 or more bulls. Student must be able to provide own transportation to each site. (Typically Offered: Spring)

VDPAM 7421D: Great Plains Veterinary Educational Center: Feedlot Management
Credits: 1.
Evaluation of production techniques and production efficiency including ration and feeding management, health management program development and evaluation, environmental management, quality assurance and field necropsy techniques. Exposure to marketing and economic considerations in feed yard decision making. A strong emphasis on population medicine, trouble shooting and problem-solving skills in the beef industry, with exposure to harvest/food safety considerations. Discussions on pharmaceutical and feed additive usage and legal implications in food supply veterinary medicine. Student must be able to provide own transportation to each site. (Typically Offered: Fall, Summer)

VDPAM 7421E: Great Plains Veterinary Educational Center: Calf Weaning Management
Credits: 1.
This is a hands-on elective in which students participate in the weaning management at the USMARC. Students will be involved with processing, feeding, finding, and treating sick calves. Additionally, students will be introduced to developing weaning rations and managing feed delivery. Students will also learn how to develop vaccination and treatment protocols and each student will have as an objective the development of their own vaccination and treatment protocol template. As time allows, students will visit commercial feed yards and cover production management topics. Student must be able to provide own transportation to each site. (Typically Offered: Fall)

VDPAM 7421F: Great Plains Veterinary Educational Center: Pregnancy Examination
Credits: 1.
The Pregnancy Examination Elective involves rectal examinations for pregnancy, chuteside data collection and data entry into a computer software program to evaluate the reproductive performance of the herd. This elective is designed for students who have some palpation experience and are interested in honing their skills. Pregnancy Examination occurs during yearly fall herd work at the USMARC, therefore, speed and accuracy will be stressed, rather than basic technique. Student must be able to provide own transportation to each site. (Typically Offered: Fall)

VDPAM 7421J: Great Plains Veterinary Educational Center: Lambing
Credits: 1.
The Lambing Elective involves students working with the USMARC lambing crew and GPVEC faculty in observations, assistance with delivery when necessary, and routine lambing duties. Students will work with veterinary personnel in sheep necropsy and health surveillance. Self-study material will be provided covering topics such as pre-breeding and breeding, pregnancy diagnosis, pregnant ewe management, pre-lambing ewe/lambing management, feeder lamb health and nutrition management, and replacement ewe and ram management. Student must be able to provide own transportation to each site. (Typically Offered: Spring)

VDPAM 7421K: Great Plains Veterinary Educational Center: Equine Dentistry

Credits: 1.

The Equine Dentistry Elective provides the opportunity for students to expand their knowledge and experience related to equine dentistry. The rotation consists of lectures on topics relevant to equine dental care and hands-on laboratories during which students practice routine dental care procedures on USMARC horses. Equine Dentistry will involve both lecture and lab time at about equal shares. Student must be able to provide own transportation to each site. (Typically Offered: Spring)

VDPAM 7421P: Great Plains Veterinary Educational Center: Bovine Surgery

Credits: 1.

The Bovine Surgery Elective is designed to give students interested in food animal surgery an opportunity to practice their surgical skills by performing penile translocations and epididymectomies on USMARC teaser bull candidates. Lectures specific to gomer bull surgery as well as other topics related to food animal surgery will be presented during this elective. Student must be able to provide own transportation to each site. (Typically Offered: Fall)

VDPAM 7421Q: Great Plains Veterinary Educational Center: Swine Husbandry

Credits: 1.

This elective provides students the opportunity to gain hands-on experience related to the daily activities of an intensively managed confinement swine unit. Rotation participants will work closely with USMARC Swine Unit personnel as they complete their daily routines in the farrowing and breeding areas of the USMARC Swine Unit and will participate in piglet delivery, neonatal pig processing, artificial and natural breeding, necropsies, and other activities as they arise. Student must be able to provide own transportation to each site. (Typically Offered: Fall, Spring)

VDPAM 7421R: Great Plains Veterinary Educational Center: Lamb Weaning Management

Credits: 1.

This elective provides the opportunity for students to develop their skills in the area of health and nutritional management of sheep immediately before and after weaning. The rotation consists of lectures on pre- and post-weaning nutrition, clinical parasitology, and prevention and control of common ovine infectious diseases. Hands-on experience during the week will take place at the USMARC Sheep Unit and will consist of walk-through and hand-on examinations of recently weaned lambs, treatment of sick lambs, inspection of weaning pen environment, investigation of herd outbreaks, and post mortem examination of all sheep mortalities. Student must be able to provide own transportation to each site. (Typically Offered: Summer)

VDPAM 7421S: Great Plains Veterinary Educational Center: Ultrasound Pregnancy Examination

Credits: 1.

The Ultrasound Pregnancy Examination Elective involves transrectal ultrasonographic examinations for pregnancy, chuteside data collection and data entry into a computer software program to evaluate the reproductive performance of the herd. This elective is designed for students who have some ultrasound experience and are interested in honing their skills. This elective occurs during yearly fall herd work at the USMARC, therefore, speed and accuracy will be stressed, rather than basic technique. Didactic instruction may include several topics in cow herd health, nutrition, management and reproductive decision making. Student must be able to provide own transportation to each site. (Typically Offered: Summer)

VDPAM 7421T: Great Plains Veterinary Educational Center: Food Animal Clinical Care and Treatment (FACCT)

Credits: 1.

This course is designed to achieve hands-on and critical thinking skills necessary to provide clinical care to cattle and sheep. Student needs will be met through structured discussions and accompanying the veterinarians in daily care of the animals at USMARC. Student must be able to provide own transportation to each site. (Typically Offered: Fall, Spring)

VDPAM 7421U: Great Plains Veterinary Educational Center: Necropsy and Diagnostic Investigations

Credits: 1.

This course is designed to develop diagnostic and critical thinking skills necessary to investigate disease outbreaks in a herd health setting. Student needs will be met through daily necropsy procedures, in depth discussions of case examples, and thorough exposure to diagnostic tests and sampling procedures. Student must be able to provide own transportation to each site. (Typically Offered: Fall, Spring)

VDPAM 7422: Beef Cattle Calving
Credits: 2. Repeatable.
This elective provides students opportunity to assist cow-calf operations with calving in Nebraska, South Dakota or other locations. These operations typically calve 300-1,000 head each spring. Calving experience is not required, but a good understanding of working around cattle is necessary. Students will be actively participating in the day to day, normal calving routine including detecting and sorting off 'springers', calf 'watch', detecting when intervention is needed and assisting delivery, caring for and monitoring newborns and dams for good health and early disease detection, tagging/processing new calves, treating calves needing intervention and performing other routine calving chores. Students need to provide their own transportation to the site and overnight stays at or near the production sites are required. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7424: Preceptorship in Diagnostic Pathology.
Credits: 1-6. Repeatable.
Advanced course in production animal medicine with emphasis on gross and diagnostic pathology. Forty hours clinical experience per week. Assignments will be preceptorships with a diagnostic laboratory, veterinary pathologist, governmental agency and/or production unit. Biosecurity policies require documentation of student's presence in the USA 5 days immediately prior to the start of class. (Typically Offered: Fall, Spring)

VDPAM 7436A: Beef Records Analysis: Introduction
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Lectures will emphasize current production and evaluation techniques for beef cow/calf operations and students will learn to conduct and critically assess production and financial data using a standardized approach. Lab activities will allow students an opportunity to become Beef Quality Assurance (BQA) certified through the Iowa Beef Center. (Typically Offered: Fall)

VDPAM 7436B: Beef Records Analysis: Herd Management
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Lectures will emphasize current production and evaluation techniques for beef cow/calf operations and students will learn to conduct and critically assess production and financial data using a standardized approach. Lab activities will allow students an opportunity to work with individual beef cattle producers to identify areas for improving profitability, health, and sustainability. (Typically Offered: Spring)

VDPAM 7436C: Beef Records Analysis: Cow/Calf Preventive Medicine
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Lectures will emphasize current production and evaluation techniques for beef cow/calf operations and students will learn to conduct and critically assess production and financial data using a standardized approach. Emphasis will be on obtaining a better understanding of nutritional and reproductive management of cow herds. Lab activities will allow students an opportunity to work with individual beef cattle producers to identify areas for improving profitability, health, and sustainability. (Typically Offered: Fall)

VDPAM 7436D: Beef Records Analysis: Feedlot Production Medicine
Credits: 1. Contact Hours: Laboratory 2.
Repeatable.
Lectures will emphasize current production and evaluation techniques for feedlot production and students will develop a standard treatment protocol book. Topics include respiratory disease, receiving programs, nutrition, cattle handling and environmental issues. (Typically Offered: Spring)

VDPAM 7445: Production Animal Clinical Medicine
Credits: 3. Contact Hours: Lecture 3.
Clinical diagnosis and treatment of diseases of swine, beef and dairy cattle, and small ruminants. (Typically Offered: Spring)

VDPAM 7450: Disturbances of Reproduction
Credits: 4. Contact Hours: Lecture 4.
Repeatable.
General principles of normal reproductive functions in addition to environment, management and diseases causing disturbances in reproduction. Cattle, Swine, Equine, Small Ruminant, and Small Animal species will be covered. (Typically Offered: Fall)

VDPAM 7451: Clinical Embryo Transfer
Credits: 2. Contact Hours: Laboratory 4.
Repeatable.
Elective clinical assignment in techniques of embryo transfer. Primary species studied will be bovine but equine and small ruminant embryo transfer will be covered during discussions. Enrollment is limited to four students per two week session. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7455: Diagnostic Laboratory Practicum
Credits: 1. Contact Hours: Laboratory 2.
Repeatable.
Practical experience and training in necropsy, recognition of gross lesions, diagnostic sample collection and test selection for the diagnosis of infectious, toxic, nutritional and metabolic diseases through exposure to diagnostic cases submitted to the ISU Veterinary Diagnostic Laboratory. The VDL accepts cases from all species; however, this course predominantly consists of porcine and bovine cases. (Typically Offered: Fall, Spring)

VDPAM 7456: Veterinary Diagnostic Lab Methods & Applications
Credits: 1. Contact Hours: Lecture 1.
An introduction to diagnostic medicine including strengths and weaknesses of various testing technologies, how to choose appropriate tests and technologies, sampling strategies in diseased and non-diseased populations and interpretation and integration of results of tests to achieve an accurate diagnosis are discussed. (Typically Offered: Fall)

VDPAM 7463: Feedlot Production Medicine
Credits: 1.
One-week VM4 elective focusing on Midwestern feedlot production. Addresses feedlot production practices common to Iowa and surrounding states, including feeding cattle on concrete or under roofs. Activities include participation and visitation to representative feedlots in Iowa. (Typically Offered: Spring)

VDPAM 7465: Animal Welfare Clinical Rotation
Credits: 2.
Two-week course for senior veterinary students to gain skills for collecting and interpreting animal welfare data, aid clients with identifying and achieving welfare goals, and assisting law enforcement with animal cruelty response. Field trips to food animal and companion animal facilities are mandatory. (Typically Offered: Fall, Summer)

VDPAM 7466X: Preceptorship in Animal Welfare
Credits: 1-6. Repeatable.
Preceptorship in animal behavior and welfare with emphasis on animal behavior and/or welfare assessment, problem solving, interventions to treat and prevent animal behavior and/or welfare cases. Mentors include practicing veterinarians, professionals consulting on animal behavior and welfare, and/or animal welfare organizations. Biosecurity: all students must follow current College of Veterinary Medicine policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7471C: Animal Reproduction: Comparative
Credits: 2. Repeatable, maximum of 4 credits.
Elective comparative clinical assignment in Theriogenology with caseload management in Food Animal, Equine, Small Animal and Small Ruminants sections. Rotation through these different sections will depend on the caseload (by species) and include routine breeding management, semen collection and cryopreservation in different species, advanced laparoscopic and non-surgical procedures for insemination and embryo flushing/transfer, pregnancy diagnosis as well as management of reproductive emergencies. (Typically Offered: Fall, Summer)

VDPAM 7471E: Animal Reproduction: Equine Reproduction
Credits: 2. Repeatable, maximum of 4 credits.
Elective clinical assignment in Equine Theriogenology involving both mare and stallion breeding management, cool-shipped semen preparation and semen cryopreservation, embryo transfer, foaling of high-risk pregnant mares as well as normal mares, breeding soundness exams of the mare and stallion, treatment of retained fetal membranes and neonatal care. (Typically Offered: Spring, Summer)

VDPAM 7471F: Animal Reproduction: Food Animal Reproduction
Credits: 2. Repeatable, maximum of 4 credits.
Elective clinical assignment in Food Animal Theriogenology involving male and female breeding soundness exams, dystocia management, advanced diagnostic and surgical procedures, surgical and non-surgical insemination programs in small ruminants, and semen cryopreservation. Medical and surgical correction of reproductive disorders in cattle, swine and small ruminants. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Spring, Summer)

VDPAM 7471S: Animal Reproduction: Small Animal Reproduction
Credits: 2. Repeatable, maximum of 4 credits.
Primary reproductive management in the canine and feline involving breeding management of the bitch and stud dog, advanced surgical and non-surgical insemination using fresh, cooled or frozen semen, and infertility case management for the male and female. High risk pregnancy management, parturition and neonatal care of both canine and felines, as required. (Typically Offered: Fall, Spring, Summer)

VDPAM 7476: Food Animal and Camelid Field Service
Credits: 1-2. Contact Hours: Laboratory 2.
Repeatable.
Students will assist university veterinarians in delivering individual animal health care and herd-based production management services to the ISU livestock farms and other livestock farms in the local area. Focus on the establishment of best practices for herd management of production systems at the university and in the region. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7477: Food Animal and Camelid Medicine and Surgery
Credits: 2. Contact Hours: Laboratory 4.
Repeatable.
Clinical assignment focused on the management of food animal and camelid medicine and surgery cases. Specific instruction in clinical evaluation of cases coupled with appropriate diagnostic testing and therapeutic intervention will be emphasized. Additional instruction will be provided in disease prevention, intensive care and management of food animal and camelid species. Particular emphasis will be placed on appropriate on-label and extra-label drug usage in food animal species. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7478A: Swine Medicine Education Center: Swine Production Management and Consultation
Credits: 2. Repeatable.
Swine production management and consulting skills within a progressive swine production and management system. Time will be split approximately with half in-class discussion topics of finance and business of the swine industry and half on-farm learning opportunities where students will visit a breeding farm, nursery facility, finishing facility, wean-to-finish facility, gilt developer unit, and a truck wash facility. (Typically Offered: Fall, Spring)

VDPAM 7478B: Drug, Vaccination, and Treatment Management for Swine
Credits: 2. Repeatable.
Basic and applied information on swine treatment options, strategies to maximize efficacy, and skills to pursue judicious use of antimicrobials, reproductive interventions, and the entire spectrum of drug therapies. The course emphasizes case based application and decisions and is approximately 30% web-based and 70% on-site including farms of a variety of structures and functions. During the course, students prepare a thorough evaluation of the pharmacologic interventions that may occur on farms and then implement this evaluation in active production facilities to maximize efficacy, compliance and animal welfare as part of a comprehensive judicious use objective. (Typically Offered: Spring, Summer)

VDPAM 7478C: Swine Medicine Education Center: Swine Emerging Diseases and Emergency Response Management
Credits: 2. Repeatable.
Diagnostic tests, methods, approaches, analysis, and evaluation of emerging swine diseases and provide general knowledge of disease elimination and methods to manage herd losses and economic losses due to disease. Two-week, on-site module that combines structured site visits and classroom activities. (Typically Offered: Fall, Spring)

VDPAM 7479: Applied Swine Production Medicine Preceptorship
Credits: 1-6. Contact Hours: Laboratory 6.
Repeatable.
Preceptorship course in swine production medicine with emphasis on herd management, production analysis, and problem solving. Forty hours clinical experience per week. Assignments will be preceptorships with a practicing veterinarian and/or a production unit. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7480: Swine Medicine
Credits: 2. Contact Hours: Lecture 1, Laboratory 2.
Repeatable.
Two week clinical rotation in swine production medicine. Students will be assigned to take the lead in investigating field based client cases with supervision of the instructors. Development of critical thinking skills that will allow students to apply concepts of herd management, production analysis, economic analysis, and disease prevention in addressing client cases. Variable amounts of travel to farm sites will be required with the potential for rare overnight stays. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7481: Advanced Cow/Calf Production Medicine
Credits: 2. Contact Hours: Lecture 1.5, Laboratory 1.5.
Two-week senior elective that will focus on the economics of animal disease in cow/calf operations. Evidence based medicine and epidemiological principles will be used in investigation of disease outbreaks. Extensive partial budgeting used. Students will complete at least two disease investigations involving outbreaks in commercial cow/calf operations and communicate their findings to the class, the herd owner, and local practitioner. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Spring)

VDPAM 7482: Applied Beef Production Medicine Preceptorship
Credits: 1-6. Repeatable.
Advanced course in beef production medicine with emphasis on herd management, production analysis, and problem solving. Forty hours clinical experience per week. Assignments will include preceptorships with a practicing veterinarian and/or a production unit. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7483: Beef Production Medicine
Credits: 2. Contact Hours: Lecture 1, Laboratory 2.
Two week advanced clinical rotation in beef production medicine. Fifteen hours recitation/discussion and 20 hours clinical experience per week. This course is designed to expose students to cow-calf and feedlot production concepts. The activities scheduled for the rotation depend greatly on the time of year. Whenever possible, the class incorporates field trips to better understand how commercial cow/calf and feedlots operate and the veterinarian's role in their management. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall)

VDPAM 7484: Dairy Production Medicine
Credits: 2. Contact Hours: Lecture 1, Laboratory 2.
Two week course in dairy production medicine combining class time with multiple on-farm visits to learn various management aspects (DHIA, DC305 & PC Dart record analysis, calf rearing through lactating cows, reproduction programs, udder health and milk quality, biosecurity, welfare, nutrition and cow comfort) for a wide variety of dairy operations. Students will learn the latest in dairy management by reviewing current topic articles and gain experience in farm evaluation through a group project. Fifteen hours recitation/discussion and 20 hours clinical experience per week. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Summer)

VDPAM 7485: Applied Dairy Production Medicine Preceptorship
Credits: 1-6. Contact Hours: Laboratory 6.
Repeatable.
Advanced course in dairy production medicine with emphasis on herd management, production analysis, and problem solving. Forty hours clinical experience per week. Assignments will include preceptorships with a practicing veterinarian and/or a production unit. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring, Summer)

VDPAM 7486: Introduction to Small Ruminant Production Medicine
Credits: 1. Contact Hours: Lecture 1.
Survey of small ruminant production systems, common management practices, and disease processes of small ruminants and camelids. This course is intended to give the student a background in small ruminant medicine. Herd health, disease monitoring and prevention, nutrition, and typical management systems will be emphasized in lecture. (Typically Offered: Spring)

VDPAM 7488: Laboratory in Clinical Microbiology
Credits: 1. Contact Hours: Laboratory 3.
Repeatable.
Application of microbiological procedures to the diagnosis of infectious diseases. (Typically Offered: Fall, Spring)

VDPAM 7490: Independent Study
Credits: 1-5. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

VDPAM 7491: Advanced Ruminant Nutrition
Credits: 2. Contact Hours: Lecture 2.6, Laboratory 0.8.
Focus on dairy nutrition and balancing rations from the calf to the adult, lactating cow. Introduction to different feedstuffs and forage varieties to determine those that are best suited to bovine diets. This course starts the week immediately prior to the start of the fall semester and continues throughout the fall semester. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall)

VDPAM 7494: Advanced Dairy Production Medicine
Credits: 2. Contact Hours: Lecture 1.3, Laboratory 1.3.
Advanced course in investigating dairy herd problems relating to milk quality or nutrition. Milk quality and nutrition troubleshooting will be taught through the combination of lecture and on-farm investigations. Students will combine lecture knowledge, data acquired from on-farm investigations and record analysis to generate management plans. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Spring)

VDPAM 7495: Advanced Small Ruminant Production Medicine
Credits: 2. Contact Hours: Laboratory 4.
Two week clinical rotation in small ruminant production medicine. Field trips (including overnight stays) will be incorporated when possible. Topics to be covered include small ruminant industries (milk, meat, and fiber), milk quality, nutrition, reproduction, and disease management of small ruminants. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel. (Typically Offered: Fall, Spring)

VDPAM 7496: International Experience
Credits: 1-12. Repeatable.
International Preceptorships and Study Abroad Group programs. Opportunities for students to be involved in applied clinical, production, and/or research experiences in international locations. The course consists of 40 hour per week experiential learning opportunities. (Typically Offered: Fall, Spring, Summer)

VDPAM 7498: Poultry Medicine

Credits: 2.

Two-week senior elective to introduce students into poultry production medicine in the Midwest. Students will participate in routine flock monitoring, biosecurity reviews, disease investigations involving outbreaks in commercial and backyard poultry operations, and have a basic understanding of the poultry industry and poultry diseases. Involves didactic lectures in the classroom, field trips to poultry farms, and necropsies. (Typically Offered: Summer)