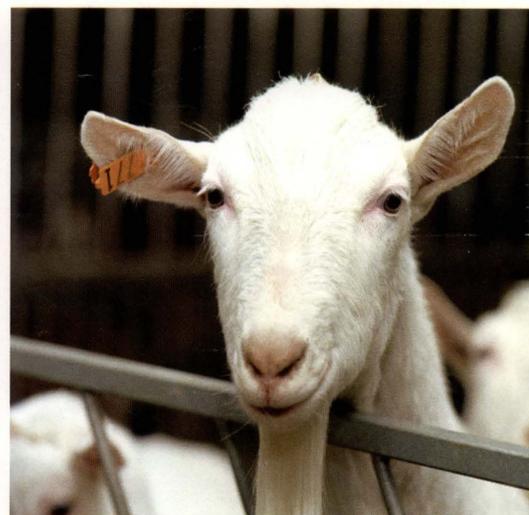


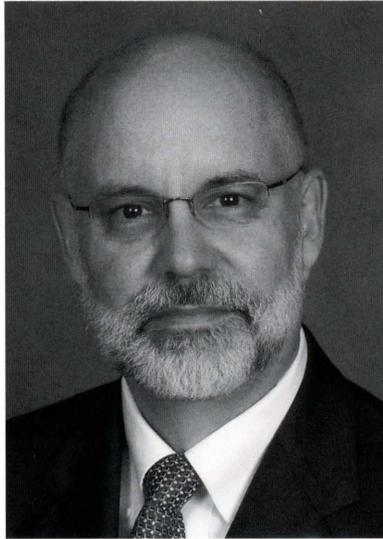
# College of Veterinary Medicine

Twin Cities 2009-11



UNIVERSITY OF MINNESOTA

**Driven to Discover<sup>SM</sup>**



Veterinary medicine is exciting, energizing, and endlessly fascinating.

Think about it for a minute. What other profession contributes to both animal and human health? What other profession can be practiced in a clinic, on a farm, in a government agency, or in a food processing plant? What other profession is on the forefront of issues ranging from food safety to raptor conservation?

Preparing new veterinarians for success in this dynamic environment is the role of the University of Minnesota College of Veterinary Medicine. We educate students in cutting-edge science as well as traditional care. We combine the knowledge learned in the classroom with practical expertise learned in the field. And we reinforce the values of leadership, community, and compassion.

Together, the faculty, staff, and students of the College of Veterinary Medicine have built one of the nation's finest educational enterprises. Our graduates prove it every day.

Trevor Ames,  
Dean

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The University of Minnesota, founded in the belief that all people are enriched by understanding, is dedicated to the advancement of learning and the search for truth; to the sharing of this knowledge through education for a diverse community; and to the application of this knowledge to benefit the people of the state, the nation and the world.

The University's mission, carried out on multiple campuses and throughout the state, is threefold:

**Research and Discovery**—Generate and preserve knowledge, understanding and creativity by conducting high-quality research, scholarship and artistic activity that benefit students, scholars and communities across the state, the nation and the world.

**Teaching and Learning**—Share that knowledge, understanding and creativity by providing a broad range of educational programs in a strong and diverse community of learners and teachers, and prepare graduate, professional and undergraduate students, as well as non-degree-seeking students interested in continuing education and lifelong learning, for active roles in a multiracial and multicultural world.

**Outreach and Public Service**—Extend, apply and exchange knowledge between the University and society by applying scholarly expertise to community problems, by helping organizations and individuals respond to their changing environments, and by making the

knowledge and resources created and preserved at the University accessible to the citizens of the state, the nation and the world.

In all of its activities, the University strives to sustain an open exchange of ideas in an environment that embodies the values of academic freedom, responsibility, integrity and cooperation; that provides an atmosphere of mutual respect, free from racism, sexism and other forms of prejudice and intolerance; that assists individuals, institutions and communities in responding to a continuously changing world; that is conscious of and responsive to the needs of the many communities it is committed to serving; that creates and supports partnerships within the University, with other educational systems and institutions, and with communities to achieve common goals; and that inspires, sets high expectations for and empowers the individuals within its community.

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The University of Minnesota is an equal opportunity educator and employer.

This publication/material is available in alternative formats upon request. Direct requests to Office of Academic and Student Affairs, College of Veterinary Medicine, 612-624-4747, [dvminfo@umn.edu](mailto:dvminfo@umn.edu).

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## **Thank You for Your Interest in the University of Minnesota College of Veterinary Medicine!**

**It is an exciting time to join the veterinary profession.**

In medicine, science, business, and agriculture, the demand for services has never been higher—and the importance of veterinary medicine has never been greater. Veterinarians care for companion and food animals, they protect the public's health, they help protect endangered wildlife, and they are often the first responders when we face threats from emerging infectious diseases. They are small-business people, community leaders, neighbors, and friends. Veterinarians truly touch peoples' lives every day.

**The University of Minnesota College of Veterinary Medicine welcomes your application for admission.**

At the University of Minnesota, you will benefit from an innovative curriculum that combines hands-on experience with broad-based medical education. You will work with faculty who are international experts in an array of areas, including urology, oncology, emerging infectious diseases, food safety, and genomics. You will study closely with large and small animal clinicians in the University's Veterinary Medical Center and other specialized facilities. It's an opportunity to work with and learn from the best.

**We're here to advise you and guide your career choices.**

You have several degree options: doctor of veterinary medicine (D.V.M.); dual D.V.M./M.P.H.; dual D.V.M./Ph.D.; M.S. or Ph.D. in basic and clinical sciences. You can care for companion animals, support agribusiness through food animal medicine, advance the conservation of wildlife, or conduct biomedical research. You can go into private practice, join an agribusiness or food company, work for a state or federal agency, or become a scientist. Whatever decisions you make, we will help you make certain they are the correct ones for you.

**If selected for D.V.M. admission or admission into a graduate program, you will join an outstanding class of students taught by a highly respected faculty.**

Admission into University of Minnesota programs is highly selective. Each year, we admit 90 students into the D.V.M. program from hundreds of applicants. Our students come from all walks of life and levels of experience. Some are admitted directly from undergraduate study, while others decide to pursue veterinary medicine after successful careers in other fields. Together, you and your fellow students constitute the next generation of veterinarians and scientific scholars—making us proud, keeping us healthy.

In these pages, you'll learn more about the University of Minnesota College of Veterinary Medicine and the opportunities to prepare for a fulfilling career.

We encourage you to visit [www.cvm.umn.edu](http://www.cvm.umn.edu) to learn more about the College of Veterinary Medicine. You may write to us at [dvminfo@umn.edu](mailto:dvminfo@umn.edu) or call us at 612-624-4747 for questions about the D.V.M. program. For information on the M.S. or Ph.D. programs, write to us at [cvmmsphd@umn.edu](mailto:cvmmsphd@umn.edu).

## **The University of Minnesota College of Veterinary Medicine: The Best Choice for You**

### **World-class Professional and Graduate Education**

The University of Minnesota College of Veterinary Medicine has a reputation for excellence in both large and small animal medicine and is a leader in the study of infectious diseases, food safety, raptor conservation, and genomics. Established in 1947, the college has graduated more than 3,500 veterinarians and hundreds of scientists. The college is especially well known for its emphasis on experiential learning and giving students practical experience. Our clinical teaching program gives students hands-on practice in the Veterinary Medical Center, livestock production units in the field, private veterinary practices, public health and animal disease regulatory agencies, and other veterinary medical institutions.

## A Prestigious University

A land-grant university with a strong tradition of education and public service, the University of Minnesota ranks among the country's top 5 research institutions and among the top 18 public universities. In addition to your veterinary studies, you will have the opportunity to pursue interdisciplinary topics and issues. Only a handful of universities have schools of veterinary medicine, medicine, public health, agriculture, law, and business all located together. This combination of disciplines exposes you to a wide variety of perspectives and learning experiences.

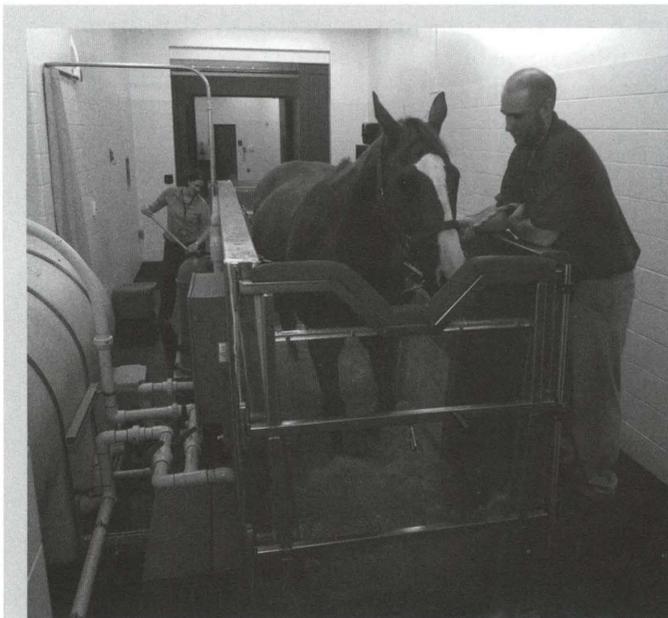
## An Exciting Metropolitan Setting

Study, sleep, study, sleep. There should be more to your educational experience than this. The University of Minnesota is home to one of the few veterinary colleges

located in a major metropolitan area. Minneapolis and St. Paul provide social and cultural benefits you won't find elsewhere. Collegia, Inc. ranks the Twin Cities as one of the top five major metropolitan locations in which to seek higher education. No matter what your interests, you'll find them here—a nationally recognized arts and theater community, a variety of ethnic cultural activities, four glorious seasons of outdoor recreation, professional sports, and restaurants for every taste.

## Learning-centered Facilities

The college is housed in a complex of interconnected buildings on the St. Paul campus, home to 3 of the University of Minnesota's 17 colleges. Veterinary students study, conduct research, and practice in these buildings, including the Veterinary Medical Center, the Veterinary Diagnostic Laboratory, the Leatherdale Equine Center, and the Raptor Center.



## Healing Horses

The Leatherdale Equine Center is a home for the equine community of Minnesota. The center combines horse-friendly medical, surgical, and exercise facilities with conference space to meet the needs of horses, owners, and equestrian organizations like the local We Can Ride program, which offers therapeutic horseback riding for children and adults with disabilities. The center treats about 3,000 horses annually.

Horses often suffer from injuries that affect their gait. To diagnose them, the center uses techniques such as ultrasound, bone scans, and MRI. To treat gait problems, the center offers an aqua treadmill, shockwave therapy, and acupuncture. A high-speed treadmill is used to analyze breathing and heart rate, which can affect speed and performance. The Aquapacer, an underwater treadmill system, helps horses with rehabilitation and strength training.

The center's surgical suite evaluates horses' hearts, stomachs, and other internal organs. Its X-ray machine is one of only five in the world powerful enough to penetrate horses' chests and is designed to take good pictures even when a horse won't stand still.

## College of Veterinary Medicine Points of Pride

### Innovative Education and Experiential Learning

- An integrated curriculum lets students learn the relationship between the basic sciences and the clinical cases they will see in their practices.
- First- and second-year students benefit from hands-on, one-on-one work with local private practitioners.
- Second-year students practice clinical skills during mini-rotations in the Veterinary Medical Center.
- Students practice with trained actors in a mock clinical setting to hone their client communication skills.
- Students develop professional skills in leadership, business, ethics, and other nontechnical areas.
- Students choose from five specialized tracks (small animal, equine, food animal, mixed animal, and interdisciplinary).
- Fourth-year students choose from over 60 rotations, from “Advanced Building Design and Herd Evaluation” to “Zoological Medicine.”
- The college was one of the first to offer a dual D.V.M./M.P.H. program, allowing students to earn doctor of veterinary medicine and master of public health degrees in as little as four years.
- Our state-of-the-art dairy calving facility is the only one in the nation where students participate in intensive two-week on-site rotations.

- The nation’s first veterinary rapid response team was deployed to Cedar Rapids, Iowa, to staff an animal shelter when scores of animals were left homeless after torrential rains and flooding during the summer of 2008. As many as 700 small animals were housed and cared for during the peak shelter operations. This team also responds to critical public health issues such as Chronic Wasting Disease.
- The college transformed the historical dairy barn into the Ben Pomeroy Student-Alumni Learning Center, providing high-tech class and meeting rooms, a commons area, and a cafe.
- Our new student orientation allows students to begin their journey to leadership positions in the veterinary profession.
- The new Leatherdale Equine Center uses state-of-the-art equipment to diagnose and cure equine diseases.
- The college has partnered with the Minneapolis Police Department to care for the horses of their mounted police.

### Cutting-Edge Research

When the Minnesota turkey industry was attacked by a deadly strain of avian pneumovirus, college researchers quickly sequenced the genome, developed new diagnostic techniques, and developed a vaccine approved by the USDA.

An equine faculty member’s discovery of the disease Polysaccharide Storage Myopathy, a painful muscle disorder, was named one of the top 10 discoveries of the last decade by *Equus* magazine.



### Jaya

Jaya, a Sumatran Orangutan from St. Paul’s Como Zoo, got off to a tough start, but he and his mother are doing great now. Jaya was delivered by emergency C-section at the University of Minnesota Veterinary Medical Center. After a few days in the intensive care unit and 10 days of constant attendance by zoo staff, veterinary staff, and students, who all wore an orange costume ape suite top to allow development of grasping strength, Jaya was successfully reintroduced to his mother, Markisa. The center provides primary care for the zoo, which works with the College of Veterinary Medicine to train students in zoo animal medicine and collaborates in research to support animal health and conservation of endangered species.

College faculty led the team that sequenced the genome of the causative agent of the deadly Johne's disease, which affects dairy cattle. This breakthrough opens the door to better diagnostics and preventive vaccines.

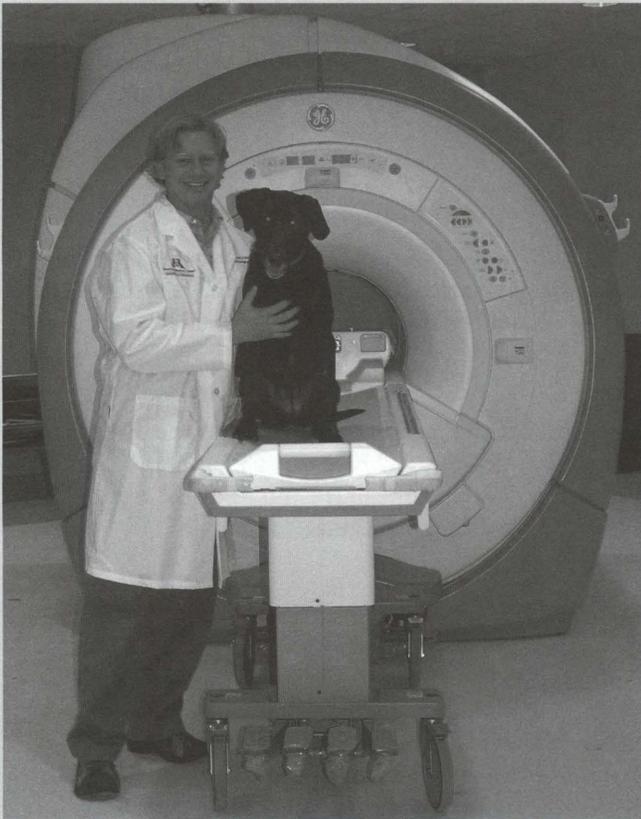
A college faculty member coined the Gentle Leader, the widely used tool for dog behavior modification. The device was named one of the top 100 inventions of the 20th century by the Smithsonian Institution.

When a worldwide outbreak of Porcine Respiratory and Reproductive Syndrome devastated the pork industry, a faculty member developed a breakthrough swine vaccine.

The possible location of an epilepsy gene has been identified in a dog breed's specific chromosomal area. Faculty are working to confirm these data and identify the gene in other breeds.

By designing studies of the underlying causes of urinary stones, the Minnesota Urolith Center continues to lead in developing safe, effective, and affordable methods to dissolve and prevent uroliths.

College researchers have discovered a gene associated with exercise-induced collapse in Labrador retrievers and have developed a test for susceptibility to the debilitating syndrome.



## U of M Researchers Identify Gene Linked to Common Ailment in Labrador Retrievers

Researchers at the College of Veterinary Medicine have identified a mutant gene in Labrador retriever dogs highly associated with the syndrome of exercise-induced collapse (EIC). After intense hunting or retrieving exercise, activities these dogs are trained to perform, affected Labradors start to lose control of their hind limbs. In most cases, their legs get wobbly and the limbs give out. In rare cases the dogs may die. Labradors are the most common dog breed in the world and an estimated 3–5 percent of Labradors have this condition.

The research team identified a mutant form of the dynamin 1 gene as highly associated with EIC. The dynamin 1 protein normally functions to maintain proper chemical communication between adjacent nerves, also known as synaptic transmission. However, the mutated form of the dynamin protein appears to have diminished function, interrupting synaptic transmission during intense exercise, and causing the muscle-controlling nerves to not fire when directed to do so.

The researchers determined that up to 30 percent of Labrador retrievers are carriers of the mutation, and they developed a genetic test to indicate whether dogs have the normal or mutated forms of the gene.

Breeds such as Chesapeake Bay and curly-coated retrievers, which are closely related to Labradors, have also been found to have the dynamin 1 mutation. The research team is now determining what other breeds might be involved and more precisely defining the specific alteration in dynamin function.

## Outstanding Programs and Resources

The University of Minnesota Veterinary Medical Center is the busiest in the United States, with over 45,000 small and large animal admissions per year. In addition to basic services, the center offers dentistry, pet behavior modification, oncology, and complementary care.

The Veterinary Diagnostic Laboratory processes more than 1 million submissions annually from the United States and abroad. The lab is nationally known for its unique molecular diagnostics.

The Center for Animal Health and Food Safety contributes to the safety and security of the global food system and strengthens our ability to anticipate and respond to threats from animal and foodborne diseases.

The University's new biosafety level-3 necropsy laboratory (one of only three in the country) provides a safe working environment in the event of an outbreak of avian influenza virus. It will also be used to contain other high risk zoonotic pathogens associated with diseases such as bovine tuberculosis, bird flu, chlamydiosis, tularemia, anthrax, West Nile, and rabies.

Internationally known for its swine expertise, the college sponsors the annual Leman Conference on

swine production issues that attracts veterinarians and producers from around the world.

The college is home to the world-renowned Raptor Center, where students and veterinarians from around the world come to learn about conservation techniques and procedures to rehabilitate injured birds of prey.

## Outstanding Graduates

JoAnne Bowman—First female veterinarian in the Army Veterinary Corps.

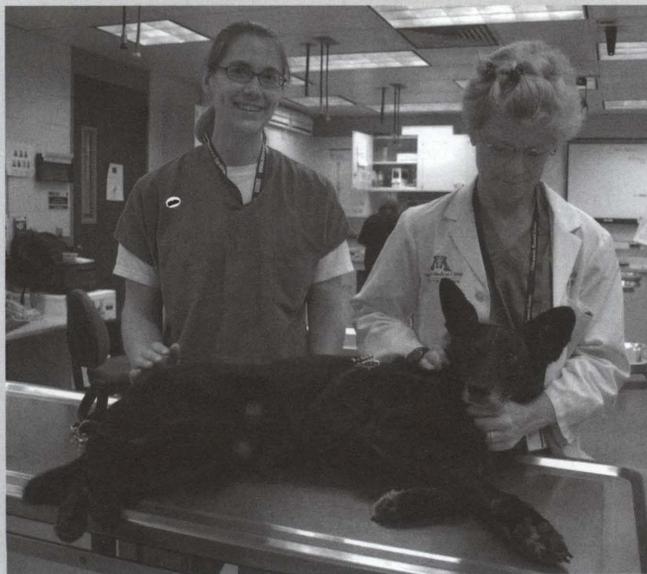
Chand Khanna—Distinguished research alumnus and director of the comparative oncology program at the National Institutes of Health.

Phyllis Kanki—Received a \$25 million grant to prevent the spread of AIDS in Nigeria.

Stan Kleven—Developed a world-renowned avian mycoplasma research and service program.

Harley Moon—One of only two veterinarians named to the National Academy of Science.

Jim Rasmussen—Veterinarian to hundreds of exotic and endangered animals at the Minnesota Zoo.



## U Researchers Treat Brain Cancer

Researchers with the College of Veterinary Medicine and the U of M Medical School and Masonic Cancer Center have successfully performed an experimental procedure to treat a dog with brain cancer. The patient, a 10-year-old shepherd-mix dog named Batman (for his black, pointed ears that resemble the superhero) was diagnosed with a cancerous brain tumor that, left untreated, would have been fatal.

The procedure involved removal of as much of the brain tumor as possible, followed by the injection of a gene therapy around the perimeter of the tumor area. The injection served to prime the remaining cancer cells for receiving a vaccine.

To date, research has involved separate investigations of the impact of gene therapy and vaccines on brain tumors. The University of Minnesota scientists and clinicians conducting this research think that surgery followed by combining the two experimental agents in one study may have greater impact on the cancer. This two-step process could have importance for improving treatment for brain tumors in animals and people.

## Choosing a Degree Program

The College of Veterinary Medicine offers the doctor of veterinary medicine (D.V.M.), dual doctor of veterinary medicine/master of public health degree (D.V.M./M.P.H.), master of science (M.S.), doctor of philosophy (Ph.D.) degree in comparative and molecular biosciences or in veterinary medicine, and dual doctor of veterinary medicine/doctor of philosophy (D.V.M./Ph.D.) degree.

### Professional Degrees

#### D.V.M.

The D.V.M. is a rigorous four-year professional program preceded by three to four years of pre-professional study. During the first three years, you will study the normal animal, the pathogenesis of diseases, and the prevention, alleviation, and clinical therapy of diseases. The program concludes with 14 months of clinical rotations in the Veterinary Medical Center, during which you will learn

#### Interested in Large Animal Medicine?

Check out VetFAST, the Veterinary Food Animal Scholars Program, encourages students to pursue large animal practice in response to the demand for veterinarians trained to work with dairy cows, beef cattle, swine, poultry, sheep, and goats. VetFAST allows entering freshmen at the University of Minnesota College of Agricultural, Food and Environmental Sciences to do the following:

- Receive an admissions decision from the College of Veterinary Medicine at the beginning of the first year of college (instead of the second or third year).
- Complete the B.S. and D.V.M. degrees in seven years (instead of eight).
- Waive the GRE requirement as part of the admission process.
- Benefit from mentorships with college faculty and students.
- Secure scholarships and financial support through summer internships.

To learn more about VetFAST, contact the College of Veterinary Medicine, 1964 Fitch Avenue, St. Paul, MN 55108-6188, 612-624-4747, [dvminfo@umn.edu](mailto:dvminfo@umn.edu), or the College of Food, Agricultural and Natural Resource Sciences, 1420 Eckles Avenue, St. Paul, MN 55108-6188, 612-624-4212.

the methods of veterinary care and develop professional practice skills. The fourth year includes 6 to 10 weeks of externship experience at off-campus sites. Upon receiving your degree, you will be qualified to work as a veterinarian, pursue additional training in a specialty, or enter a graduate degree program. More detailed information about the D.V.M. curriculum is found on pages 11-14.

#### D.V.M./M.P.H.

The Veterinary Public Health Program, one of the first in the nation, allows veterinary students to simultaneously earn a D.V.M. and a master's degree in public health (M.P.H., 42 credit hours) in as little as four years. This option allows you to obtain the credentials to work in government or industry on issues related to food safety, emerging infectious diseases, biosecurity, and public health. Here's how the program works:

- Once admitted to the D.V.M. program, you apply directly to the M.P.H. program (see [www.sph.umn.edu](http://www.sph.umn.edu)).
- You may take M.P.H. coursework the summer before and during summer break. The coursework includes online distance learning courses and two three-week public health institutes held on the University's Minneapolis campus during May session. To help keep the tuition costs down, you are allowed (with approval) to transfer up to 14 D.V.M. credits to the M.P.H. program.
- In the program, you complete a public health field experience and a master's project under the guidance of a faculty adviser.
- The M.P.H. is offered by the School of Public Health, and the tuition costs are separate from those of the College of Veterinary Medicine.

#### D.V.M./Ph.D.

The most significant medical discoveries result from collaboration between the basic sciences and clinical medicine. Clinician scientists, who play a unique role in this process, are skilled in both hypothesis-based research and clinical practice. Our graduates become tomorrow's leaders in veterinary medicine. The D.V.M./Ph.D. curriculum requires completion of all professional

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**B.S. in Veterinary Science**—For students who complete their undergraduate veterinary college prerequisites in three years or less, have not completed a baccalaureate degree, and are accepted into the College of Veterinary Medicine earn a B.S. after completing one year of the veterinary science curriculum.

degree requirements, as well as additional graduate study and bench research that is the basis of the Ph.D. thesis. Dual degree candidates must be accepted into the D.V.M. program before consideration for the Ph.D. program. Once accepted, students have two options for completing a dual degree: the concurrent dual degree option (students pursue the Ph.D. in the middle of their veterinary studies) and the sequential dual degree option (students complete the D.V.M. degree before starting Ph.D. studies). Financial support is available.

## Graduate Degrees

The college offers you the opportunity to pursue graduate study with master's and Ph.D. options. The college has two graduate programs: (1) comparative and molecular biosciences and (2) veterinary medicine. The programs draw on the expertise of basic scientific researchers and on the applied research skills and knowledge of board certified veterinary clinicians.

Comparative and molecular biosciences (CMB) is a multidisciplinary program in basic and comparative research mechanisms of health and disease. It provides students an understanding of animal disease, animal populations, comparative aspects of biology and pathology across species, and animal models of human disease. Through laboratory rotations, coursework, and techniques workshops, first-year students are exposed to various disciplines and research projects to help them define their areas of interest. The CMB graduate degree can lead to a career as an investigator in private industry, government, or academia, in areas such as immunobiology and pathology; microbiology and virology; genetics and genomics; cellular and molecular biology; neuroscience; and physiology and pharmacology.

Veterinary medicine (VMED) focuses on basic and applied sciences in the area of animal and comparative health. Applied scientific research is utilized to advance understanding of clinical disease in animals. The specialty tracks in this program, which can lead to careers in academia, industry, or government service, include the following:

- Comparative medicine and pathology studies the fundamental nature of disease in individual animals; pathological processes, their time course, and diagnosis; and ways to reverse or prevent organ deterioration.
- Infectious disease focuses on diseases attributable to pathogenic infectious organisms and their prevention.
- Population medicine focuses on the occurrence and prevention of diseases in susceptible animal populations.

- Surgery/radiology/anesthesiology focuses on the restoration of health through surgical management (surgery); the assessment of morphology, physiology, and pathophysiology through imaging (radiology); and the management of pain (anesthesiology) and pathophysiologic catastrophes (critical care).

## Curriculum

Students and advisers develop an individualized curriculum. Students are required to complete at least one statistics course, an animal research ethics course, and seminar course(s) specific to their program, and to give public research presentations. Students are encouraged to develop their teaching and presenting skills, particularly students planning to enter the academic profession.

## Admissions

Admission to the graduate programs is competitive and depends upon the applicant's academic credentials, test scores, research and laboratory experience, and the availability of funding for graduate student support. Admission criteria can be found at [www.cvm.umn.edu/cmb](http://www.cvm.umn.edu/cmb) or [www.cvm.umn.edu/vmed](http://www.cvm.umn.edu/vmed). The online application is at [www.grad.umn.edu](http://www.grad.umn.edu) under "prospective students."

The comparative and molecular biosciences program offers admission primarily for fall semester. The application deadline is January 15. Typically, four or five Ph.D. students and one or two M.S. students join the program each fall.

The veterinary medicine graduate program enrolls approximately 12 new students fall semester and 2–4 students each spring semester. The application deadline is March 1 for fall semester and October 1 for spring semester.

## Alumni

The college's graduates have secured positions in various academic, government, and industrial organizations. Institutions such as Northwestern University, Wake Forest University, Yale University, St. Olaf College, Harvard University, Stanford University, and the University of Minnesota have hired the college's graduates as postdoc scientists, postdoc fellows, and assistant professors. Its alumni work for the USDA, Veteran's Administration, and Homeland Security. Industries such as Medtronic, R & D Systems, Jackson Laboratories, Pfizer, and GlaxoSmithKline, Inc. have CMB or VMED graduates leading their research teams.

The graduate programs are administered jointly by the University of Minnesota Graduate School and the College of Veterinary Medicine. For information regarding the graduate programs, contact the graduate program office at [cvmmsphd@umn.edu](mailto:cvmmsphd@umn.edu) or 612-626-1948. The Web sites for comparative and molecular biosciences ([www.cvm.umn.edu/cmb](http://www.cvm.umn.edu/cmb)) and for veterinary medicine ([www.cvm.umn.edu/vmed](http://www.cvm.umn.edu/vmed)) contain detailed information regarding the programs. The Graduate School's Web site ([www.grad.umn.edu](http://www.grad.umn.edu)) contains application information.

### *Summer Scholars Program*

A new generation of scientists must be trained to harness the benefits of genomic information to strengthen animal agriculture in the United States. The Summer Scholars Program in the College of Veterinary Medicine provides our first- and second-year students with systematic access to basic and translational research training. This enables students to address critical issues in zoonotic disease and food safety. Students work with faculty in their research laboratories during the summer. Students are competitively selected based on short research proposals they prepare based on mentors' area of research interest. Students participate in a weekly seminar program where topics include ethics of animal research, scientific writing, keeping a data book, and alternative careers for veterinarians. Of the 92 students who have participated over the past seven years, several have been admitted to or completed the M.S. or Ph.D. degree, the D.V.M./M.P.H. program, or residency or internship programs.

## Preparing for D.V.M. Admission

You may be fresh out of high school when you decide to pursue a career in veterinary medicine; you may already have a couple years of undergraduate work completed; or you may have decided it's time for a career change. No matter what your situation, it's helpful to know what's required for admission before you apply.

### High School Students

You should begin preparing for your college career by taking as many math and science courses as possible in high school, including biology, chemistry, and physics. Become familiar with the veterinary profession by volunteering or securing paid experience at a veterinary clinic, riding on calls with a large animal veterinarian, working on an animal-related research project with a college professor, or volunteering at a humane society or animal shelter. Then, verify admission requirements with

the college or university at which you plan to complete your preprofessional coursework.

## Undergraduate Students

You may pursue your pre-veterinary studies at any accredited college or university. You may apply to the College of Veterinary Medicine during the academic year in which all of your required pre-veterinary coursework is complete. For most students this is during senior year, for others it might be during third year of college. About 20 percent of students enter the D.V.M. program without completing their bachelor's degree first.

## D.V.M. Application Procedure

The application deadline is the first week of October—almost one full year in advance of the first semester for which you enroll. Please check the Web site for the exact deadline. The college belongs to the national Veterinary Medical College Application Service (VMCAS), so you may use one application to apply to any of the veterinary colleges belonging to VMCAS. You may submit your application at [www.aavmc.org](http://www.aavmc.org). If you have questions about the application, please call the college's Academic and Student Affairs Office at 612-624-4747 or write to us at [dvminfo@umn.edu](mailto:dvminfo@umn.edu).

## Evaluating Your Application

Your application will be evaluated on

- GPA in required pre-veterinary courses
- GPA for the 45 most recent semester courses
- GRE score—all three areas
- Knowledge of the profession, interest in animals, and professional goals
- Employment experience, communications skills, leadership, and extracurricular activities
- A structured behavioral interview that helps identify if a career in veterinary medicine is the right choice for you. The college is one of the first to implement this, based on the recommendation of the veterinary industry, practitioners, and our faculty.

## What It Costs

The cost of a D.V.M. veterinary education is an important financial investment. Here are the approximate costs for the 2008-09 academic year.

### 2008-09 Tuition Rates and Estimated Expenses

Resident .....	\$22,264
Nonresident.....	\$40,923
Student services fee .....	\$778
Computer.....	\$1,200
Books, lab equipment, notes, dissecting set, and supplies .....	\$1,600
Health Insurance .....	\$2,196

*Tuition and fees are subject to change without notice.*

Fourth year veterinary students pay additional tuition for summer semester. The above expenses do not include living expenses, other incidental expenses, or the nonrefundable intent-to-enroll deposit of \$250. If you enroll, the deposit is applied to your first semester's tuition. For more information, call the Academic and Student Affairs Office at 612-624-4747 or write to [dvminfo@umn.edu](mailto:dvminfo@umn.edu).

## Residency

Minnesota residents receive priority consideration for admission and are charged a lower tuition rate than non-residents that are admitted to the program. To qualify for resident status, you must live in Minnesota for at least one calendar year before the application deadline. For more information, contact the Resident Classification and Reciprocity Office by calling 612-625-4733 (St. Paul) or 612-625-6330 (Minneapolis) or by writing to 130 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108 or 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455.

## Reciprocity

The University has reciprocity agreements with South Dakota and Manitoba, Canada. If you are a resident of South Dakota or Manitoba, you may qualify for reciprocity tuition rates, which are comparable to resident tuition rates. North Dakota residents are covered under a contract arrangement with the University that would permit up to five seats for residents of North Dakota in the entering veterinary class at the University. If approved by the North Dakota University System Office, these students would pay the equivalent of resident tuition.

For more information, call the Residency Classification and Reciprocity Office at 612-625-4733 (St. Paul) or 612-625-6330 (Minneapolis) or write to the One Stop Service Center, 130 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108.

## Prerequisite Coursework

The following coursework is required for admission to the College of Veterinary Medicine. If you plan to pursue a career in academia or research, you should consider additional courses in science and mathematics.

### Biology (13-20 credits)

General biology or plant biology.....3 credits with lab

Zoology or animal biology.....3 credits with lab

Genetics..... 3 credits

Should include the mechanisms of heredity and their applications.

Microbiology..... 4 credits

An introductory course with lab that includes taxonomy, morphology, physiology, and ecology of microbes.

### Chemistry (17-27 credits)

General chemistry with lab..... 8 credits

Organic chemistry with lab..... 6 credits

(Two quarters or one semester)

Biochemistry with or without lab..... 3 credits

### Liberal arts and humanities (12-18 credits)

History and social science ..... 6 to 9 credits

Anthropology, economics, geography, history, political science, psychology, social science, and sociology courses can usually be used to fulfill this requirement.

Arts and humanities..... 6 to 9 credits

Art, literature, music, humanities, theater, and foreign language literature courses can usually be used to fulfill this requirement.

### Mathematics (3 credits)

College algebra (with prerequisite high school higher algebra) or pre-calculus or calculus.

### Physics (8-12 credits)

Should include mechanics, heat, sound, light, electricity, fluids, and atomic structures, topics normally covered in an introductory sequence with laboratory.

### Writing skills (8 credits)

Students must satisfy the requirement for graduation at the college they are attending.

### Electives

Electives may be selected based on your interests in a broad educational program. You're encouraged to choose courses in the care and management of animals when available.

Other recommended electives include courses in business management, animal nutrition, electronic communication, statistics, economics, and public speaking.

## Profile of 2008 Successful D.V.M. Applicants

Applications .....	1153
Resident .....	217
Nonresident.....	916
GPA in required courses (mean) .....	3.53
GPA last 45 semester credits (mean) .....	3.64
GRE Verbal & Quantitative: combined score (mean) .....	1170

## Financial Aid

Veterinary students may apply for federal Ford loans (\$8,500/year limit) and health professions loans (amount based on need) for financial assistance. The University of Minnesota uses the Free Application for Federal Student Aid (FAFSA) as its needs analysis form. Students are encouraged to use the Web site for the FAFSA application found at [www.FAFSA.ed.gov](http://www.FAFSA.ed.gov). All applicants to the D.V.M. program are considered independent financial aid filers, and parental income does not play a role in determining financial need, regardless of the applicant's age. The FAFSA Web site is available after January 1 each year, but students should complete their federal tax return before submitting their FAFSA. The code number for the University of Minnesota is 003969.

Financial aid for all veterinary medicine students is administered by the Office of Student Finance, University of Minnesota, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455. Second-, third-, and fourth-year students may also compete for more than \$100,000 in awards and scholarships, which are presented at the college's spring awards ceremony.

## We're Here for You

### Student Services

If you have questions, we've got answers. If you need someone to talk to, we're here for you. If you're looking for an extracurricular activity, we can hook you up. Here are some of the services and programs we can provide.

- **Planning your educational program**—We host regularly scheduled information sessions for you to visit campus and learn about the D.V.M. degree program, selection criteria, and application procedures and take a tour of the college. To schedule a visit, call the Academic and Student Affairs Office at 612-624-4747 or write to [dvminfo@umn.edu](mailto:dvminfo@umn.edu). If these sessions do not meet your needs or you need more information, we will arrange a meeting with an admissions counselor.

- **Maintaining your student records**—The Academic and Student Affairs Office maintains records on admissions, registration, scholastic standing, and degree requirements.
- **Finding a mentor**—Veterinary professionals can be a tremendous resource for you. That's why we offer a formal mentor program for D.V.M. students.
- **Financing your education**—The Office of Student Finance provides answers, along with on-site financial aid counselors in the College of Veterinary Medicine at the start of each semester. The Academic and Student Affairs Office provides information on scholarships.
- **Providing support to student organizations**—The Academic and Student Affairs Office provides administrative assistance to faculty advisers and student organizations.

## Student Organizations

Participation in student organizations can help create a rich and satisfying learning experience, while helping you establish a network of peers and friends that you'll carry with you through your career. As a veterinary student, you may participate in the following organizations:

- Alpha Psi
- Behavior Club
- Canine Club
- Christian Veterinary Fellowship
- Equine Club
- Emergency and Critical Care Society
- Feline Club
- Holistic Medicine Club
- Production Animal Medicine Club
- Sheep, Goat, and Llama Club
- Veterinary Business Management Association
- Zoo, Exotic, Avian, and Wildlife Club

Looking for leadership or governance opportunities? Get involved in the following organizations:

- Honor Case Commission
- St. Paul Campus Board of Colleges
- Student Council
- Student Chapter of the American Veterinary Medical Association

## Housing Information

Need a place to live? Check out our Roommates Connection, a listing of students wanting to share a place to live with other veterinary students. The Office of Academic and Student Affairs also has a listing of apartments for rent. This information is sent to the newly admitted D.V.M. students in the late spring.

The University's off-campus housing Web site is at <http://www.housing.umn.edu/offcampus>. The University maintains two family housing sites, one on the St. Paul campus. The Housing & Residential Life home page is at [www.umn.edu/housing](http://www.umn.edu/housing).

## After Graduation: Staying Connected

### Continuing Education

The University of Minnesota College of Veterinary Medicine offers a wide variety of learning opportunities for you to hone your skills, expand your horizons, and maintain your professional licensure:

- Hear nationally and internationally known experts lecture on fields of veterinary medicine.
- Learn about new concepts, recent research developments, and innovative clinical procedures.
- Build relationships with practicing veterinarians and with academia and industry representatives.

Continuing education courses are also open to our students. Courses are held in the Twin Cities metro area. Visit [www.cvm.umn.edu/outreach](http://www.cvm.umn.edu/outreach) or call 612-624-2268 or 1-800-380-8636.

### Alumni and Friends

All graduates become members of our Alumni and Friends Society, which promotes interest and support for the College of Veterinary Medicine, encourages communication and cooperation among alumni, and advises the dean on the dispersal of undesignated gifts to the college. The society's activities include an award-winning mentor program, a senior reception, international externships, undergraduate research, student council awards, alumni receptions, and an alumni newsletter.

## The D.V.M. Curriculum

### The Learning Curve

- During the first year, you will learn about the structure and function of normal animals. You will also begin your clinical training.
- During the second year, you will focus on infectious agents and the cause of disease. You will also begin to learn about disorders of organ systems and the treatment of these disorders. This year will include your first surgery labs.
- The third year will conclude your classroom learning of organ system disorders. You will also start to focus, in advanced courses, on the species of most interest to you.
- The fourth year puts into practice the knowledge, skills, and behavior that you have learned in the classroom. You will choose hands-on rotations that focus on your specific areas of interest.

The college's four-year curriculum is based on standards established by the Council on Education of the American Veterinary Medical Association. Course requirements for the first three years are similar for all students. The curriculum offers flexibility in scheduling, an integrated approach to course topics, clinical coursework early in the program, and opportunities to develop professional practice skills before the fourth-year clinical rotations. The fourth-year clinical rotations offer students flexibility in selecting topics. A breakdown of the program follows:

### First Year

Fall Semester		Credits
CVM 6000	Orientation to Veterinary Medicine	1
CVM 6011	Professional Development I: Transitioning to the Veterinary Profession	2
CVM 6021	Overview of Animal Populations	1
CVM 6100	Veterinary Anatomy	5
CVM 6101	Small Animal Radiology	1
CVM 6110	Veterinary Physiological Chemistry	3
CVM 6111	Histology	3
CVM 6134	Principles of Veterinary Nutrition	2
CVM 6301	Clinical Skills I	1
Total	.....	19

## Spring Semester

CVM 6012	Professional Development II: Clinical Communication	2
CVM 6112	Organology	3
CVM 6120	Veterinary Neurobiology	2
CVM 6130	Veterinary Physiology	6
CVM 6141	Veterinary Pharmacology	2
CVM 6201	Host Defenses	2
CVM 6204	Infectious Agents: Virology	3
CVM 6211	Applied Veterinary Genetics	1
CVM 6298	Basic Pathology	2
CVM 6302	Clinical Skills II	1
CVM 6441	Behavior Core	2
Total		26

Plus selected electives from Optional Elective Choices list on page 13

## Second Year

### Fall Semester

CVM 6013	Professional Development III: Applied Communication	2
CVM 6132	Reproductive Biology	2
CVM 6202	Infectious Agents: Parasitology	4
CVM 6203	Infectious Agents: Bacteriology	3.5
CVM 6205	Infectious Agents: Pharmacology	1.5
CVM 6220	Clinical Epidemiology	1.5
CVM 6299	Systemic Pathology	5
CVM 6303	Clinical Skills III	1
CVM 6840	Swine Core	2
Total		22.5

### Spring Semester

CVM 6014	Professional Development IV: Thinking Like a Doctor	2
CVM 6102	Veterinary Imaging I	2
CVM 6142	Veterinary Neuropharmacology	1
CVM 6304	Clinical Skills IV	1
CVM 6321	Surgery, Anesthesia, Critical Care	4
CVM 6400	Diseases of Skin and Adnexa	3
CVM 6430	Cardiopulmonary System Diseases	4
CVM 6440	Nervous System Disorders	2
CVM 6444	Ophthalmology	2
CVM 6460	Urinary Systems Disorders	2
CVM 6480	Obstetrics and Reproductive Diagnostics	1
CVM 6534	Veterinary Clinical Pathology	4
CVM 6880	Avian Core	2
Total		30

Plus selected electives from Optional Elective Choices list shown on page 13

## Third Year

### Fall Semester

CVM 6027	Large Animal Hospital Practicum	1
CVM 6029	Small Animal Hospital Practicum	1
CVM 6103	Veterinary Imaging II	2
CVM 6195	Veterinary Toxicology	3
CVM 6305	Clinical Skills IV	1
CVM 6410	Large Animal Digestive Disorders	2
CVM 6411	Small Animal Gastroenterology	3
CVM 6420	Musculoskeletal System Diseases	2
CVM 6451	Metabolic Disorders	3
CVM 6470	Multisystemic Diseases	3
CVM 6483	Reproductive Diagnostic Techniques	1
Total		22

In addition, students must choose at least one lecture and one lab from the following:

CVM 6482	Reproductive Diseases of Small Animal	1
CVM 6685	Small Animal Diagnostic Technique Lab	1
CVM 6702	Large Animal Palpation Lab	2
CVM 6704	Reproductive Diseases of Cattle	2
CVM 6727	Equine Palpation Lab	1
CVM 6728	Reproductive Diseases of the Horse	1
CVM 6793	Small Ruminant Reproduction	1.5
CVM 6800	Bovine Palpation Lab	1

### Spring Semester

CVM 6027	Large Animal Practicum: Year 3	1
CVM 6029	Small Animal Practicum: Year 3	1
CVM 6030	Public Health	2
CVM 6031	International Diseases	1
CVM 6042	Practice Management/Law and Ethics	2
CVM 6494	Small Animal Anesthesia Core	1
CVM 6495	Non-Traditional Pets	1
Total		9

In addition to the above, students are required to

- Participate in either a small or large animal hospital practicum.
- Take at least 12 credits from the Required Elective Choices list. Elective choices are based on the selected track.
- Complete two clinical rotations.

Students must take at least 16 elective credits (with at least 12 during spring of year three). These credits can be in any combination from the Required Elective Choices and Optional Elective Choices lists.

## Required Elective Choices

CVM 6104	Small Animal Special Procedures in Radiology	I
CVM 6105	Small Animal Ultrasound	I
CVM 6136	Small Animal Nutrition Advanced Block	2.5
CVM 6306	Small Animal Clinical Skills Advanced Block	I
CVM 6404	Small Animal Dermatology Advanced Block	I
CVM 6414	Small Animal Liver and Pancreas Disorders Advanced Block	I
CVM 6424	Small Animal Orthopedic Advanced Block	I
CVM 6434	Critical Care Advanced Block	I
CVM 6436	Small Animal Cardiology	I
CVM 6442	Small Animal Behavior	I
CVM 6461	A Clinician's Analysis of Urinalysis	I
CVM 6464	Small Animal Urinary Systems Disorders: Case Based Discussion	I
CVM 6482	Reproductive Diseases of Small Animals	I
CVM 6483	Reproductive Diagnostic Techniques	I
CVM 6497	Avian Medicine and Surgery	I
CVM 6685	Small Animal Diagnostic Technique Lab	I
CVM 6702	Large Animal Palpation Lab	2
CVM 6704	Reproductive Diseases of Cattle	2
CVM 6727	Equine Palpation Lab	I
CVM 6728	Reproductive Diseases of the Horse	I
CVM 6730	Equine Advanced Elective	3.5
CVM 6731	Equine Advanced Elective: Surgical Supplement	2
CVM 6790	Advanced Small Ruminant Practice	1.5
CVM 6800	Bovine Palpation Lab	I
CVM 6801	Advanced Dairy Production Medicine	I
CVM 6802	Large Ruminant Clinical Elective	I
CVM 6803	Advanced Bovine Practice Lab	I
CVM 6805	Food and Exotic Large Animal Anesthesia	.5
CVM 6841	Swine Behavior	.5

## Optional Elective Choices

CVM 6001	International and Cultural Immersion	.5
CVM 6307	Clinical Skills Elective	I
CVM 6481	Obstetrics Lab	I
CVM 6519	Wildlife Rehab Center Internship	2
CVM 6545	Introduction to Regulatory Medicine (even years only)	2
CVM 6560	Public Health Issues and Veterinary Medicine Opportunities	I
CVM 6690	Integrative Medicine	2.5
CVM 6718	Large Animal Community-based Practice Mentoring	I

CVM 6721	Neonatology	I
CVM 6722	Clinical Anatomy of the Equine Limb	I
CVM 6865	Introduction to Swine Production Medicine	I
CVM 6930	Medical Management of Zoo Animals	I
CVM 6934	Selected Topics in Zoo Animal Medicine	5

## Fourth Year (Summer, Fall, and Spring)

You'll begin by selecting a track. Each track has specific requirements.

- Small animal—companion animals consisting mostly of cats and dogs.
- Food animal—bovine (dairy and beef), swine, and small ruminants
- Equine—for those wishing to be strictly equine veterinarians
- Mixed—a combination of small animal, food animal, and equine courses and rotations
- Interdisciplinary—for those wishing to do research, public health, etc.

All students are required to:

- Participate in either a small or large animal hospital practicum.
- Complete 25 clinical rotations (to bring total clinical rotations to 28).

## Clinical Rotations

Clinical rotations occur in 28 two-week blocks. The rotations include:

- 10 blocks of core clinical courses in medicine, surgery, public health, necropsy, anesthesiology, and radiology (required for all tracks)
- 3–5 two-week externships or rotations at other institutions, which occur off campus
- 6 selected rotations based on the track requirements (not required for interdisciplinary track)
- 5–8 elective rotations (or 17 electives for the interdisciplinary track)

Students can choose from the following rotations to create their schedule:

### *Comparative Services*

- Advanced Public Health
- Clinical Laboratory Medicine
- Comparative Anesthesiology
- Comparative Ophthalmology
- Comparative Radiology
- Finance and Small Business
- Minnesota Zoological Medicine
- Necropsy
- Radiology: Mixed Animal
- Raptor Center
- Veterinary Acupuncture
- Veterinary Public Health
- Veterinary Toxicology

### *Equine*

- Equine Ambulatory Rotation
- Equine Dentistry and Preventive Medicine
- Equine Lameness and Podiatry
- Equine Sports and Rehabilitative Medicine
- Equine Theriogenology Introduction
- Equine Theriogenology Advanced
- Large Animal Diagnostic Ultrasonography

### *Food Animal*

- Advanced Building Design
- Advanced Feedlot Herd Health
- Advanced Swine Health and Production Introduction
- Bovine Surgery
- Camelid Medicine, Surgery, Reproduction, and Health Management
- Cow-Calf Herd Production
- Dairy Herd Health
- Dairy on Farm Campus
- Dairy Production Medicine I, II, III, IV
- Dairy Theriogenology Palpation
- Directed Studies in Dairy Production Medicine
- Food Animal Disease and Diagnostics
- Fresh Doe and Goat Kid Management
- Introduction to Swine Health and Production
- Miracle of Birth
- Population Diagnostics and Therapeutics
- Principles of Population-based Diagnostics and Therapeutics
- Small Ruminant Health and Production
- Swine Disease
- Swine Health and Production Advanced
- Swine Virology

### *Large Animal*

- Large Animal Medicine
- Large Animal Surgery and Lameness

### *Other*

- Directed Studies–Diagnostic Medicine
- Directed Studies–Large Animal
- Directed Studies–Pathobiology
- Directed Studies–Small Animal
- Externship
- Externship in Public Health Practice
- Masters Project: Public Health Practice
- Orientation to Clinics (required)
- Rotation at Other Institutions

### *Small Animal*

- Advanced Clinical Oncology
- Behavior
- Cardiology
- Companion Birds
- Critical Care
- Dermatology
- Elective Small Animal Surgery
- Emergency Rotation
- General Practice
- Neurology
- Small Animal Clinical Nutrition
- Small Animal Internal Medicine A and B
- Small Animal Rehabilitation
- Small Animal Surgery
- Small Animal Theriogenology
- Small Animal Ultrasound
- Veterinary Dentistry Rotation

## **Policies**

### **Academic Calendar**

The University follows a semester schedule. Fall semester begins in September, spring semester in January, and summer semester in May. The college begins spring semester earlier than the rest of the University.

### **Access to Student Educational Records**

In accordance with regents policy on access to student records, information about a student generally may not be released to a third party without the student's permission. (Exceptions under the law include state and federal educational and financial aid institutions.)

Some student information—name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn, and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned—is considered public or directory information. Students may prevent the release of public information. To do so, they must notify the records office on their campus.

Students have the right to review their educational records and to challenge the contents of those records. The regents policy is available for review on the Web at [http://onestop.umn.edu/grades\\_and\\_transcripts/student\\_education\\_records\\_policy.html](http://onestop.umn.edu/grades_and_transcripts/student_education_records_policy.html), at 200 Fraser Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to One Stop Student Services Center, 200 Fraser Hall (612-624-1111).

Students are responsible for updating their personal information, which can be done online through the “Personal Information” link at <http://onestop.umn.edu>.

### **Animal Use**

The college uses animals in the D.V.M. curriculum to illustrate medical principles and provide students with critically needed firsthand experience in the art of veterinary medicine and surgery. The animals are treated with dignity and genuine concern for their welfare. In some cases, they eventually must be euthanized in accordance with the Animal Welfare Act.

Finding humane and effective alternatives to animal use is a college priority. The college continually evaluates how it teaches clinical skills, and continues to add to the progress it already has made in refining, reducing and sometimes eliminating animal use in its courses. Among other improvements, the college has developed an innovative partnership with the local humane society, under which students can get extensive experience in neuter and spay surgeries to make the animals more adoptable. Students may serve on the college’s animal use committee that considers new alternatives while preserving the effectiveness of the educational process.

At the same time, the college wants to make sure prospective students know that the D.V.M. curriculum requires learning experiences with both live and cadaver animals. The University’s animal care committee reviews all courses and determines the appropriateness of using animals in each course.

### **Attendance and Examinations**

You’re expected to attend all scheduled classes and instructional sessions unless they are specifically identified as optional. If you need to miss a class, you’re responsible for all material presented in the course whether or not the material is included in notes or other printed materials. You have a responsibility to inform the instructor if you must miss a scheduled examination, quiz, or deadline for anything that will count toward your grade. Requests for individual rescheduling of examinations or assignment deadlines must be approved by the instructor. Instructors have no obligation to reschedule a test due to an unexcused absence and can, therefore, assign a grade of zero. For more information about the policy on attendance and examinations, contact the Office of Academic and Student Affairs.

The college uses comprehensive academic assessment tools at various times during the program and in accordance with the D.V.M. Academic Standards Policy.

### **Catalog Use**

The information in this catalog and other University catalogs, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes. This publication/material is available in alternative formats upon request. Please contact Brian Graves, Advancement Office, 457 VMC, 1365 Gortner Ave., St. Paul, MN 55108, 612-624-6228.

This catalog is available online at [www.catalogs.umn.edu/vetmed](http://www.catalogs.umn.edu/vetmed).

### **Degree Requirements**

The doctor of veterinary medicine degree is awarded following the satisfactory completion of the four-year professional curriculum with a grade point average of 2.00 or above.

The Ph.D. or M.S. degrees are awarded according to the Graduate School policies.

The NAVLE, taken for licensure, is given twice per year—once in the fall and again in the spring. Most students take the test in the fall. Passing the NAVLE precedes granting of licensure to practice in any state. Students sit for the boards of the specific state in which they wish to practice and transfer NAVLE scores to the state before beginning practice.

## D.V.M. Honor System

An honor system operates on the assumption that students are honest. That's why students, rather than faculty, monitor examinations. Students are trusted not to give or receive aid during examinations and are responsible for their own honesty.

The Honor Case Commission, composed of students elected from the four classes, confidentially considers reports of suspected acts of dishonesty during examinations. The commission may request a hearing to determine if scholastic dishonesty has occurred. If so, four faculty representatives are selected by the dean and the Faculty Council to form a Student-Faculty Honor Case Commission that will participate in the hearing. If they determine that the student involved is guilty, an appropriate penalty will be determined and referred to the dean for implementation. In addition to the Honor Code the College of Veterinary Medicine expects its students to abide by the University of Minnesota's Student Conduct Code.

## D.V.M. Scholastic Requirements

A student earning an F in a required (core or track) **preclinical** course must repeat this course and earn a grade of at least C. An F will also trigger review of the student's grades in any other courses in that semester and those with grades of less than C must also be repeated. The student will not be allowed to progress in the curriculum until the course(s) is successfully completed with a grade of at least C. This will require that the student be placed on academic leave until the course(s) is offered again.

A second F in any required (core or track) **preclinical** course will result in dismissal from the curriculum.

A student must have a GPA of at least 1.50 to advance to the next semester of the curriculum. A student with less than a 1.50 semester GPA will be required to prepare a plan for improvement and present it to the associate dean for academic and student affairs. The student will then bring the plan before the Student Promotion Committee (SPC), which will consider the plan and prepare a contract for academic performance. The committee may require that the student retake any course with a grade lower than a C. If a GPA of less than 1.50 is earned in a subsequent semester, the student will be dismissed from the curriculum.

A student must have a cumulative GPA of at least 2.00 to advance to the next year of a program or begin rotations. A student with less than a 2.00 cumulative GPA will be required to prepare a plan for improvement and present it to the associate dean for academic and student affairs.

The student will then bring the plan before the SPC, which will consider the plan and prepare a contract for academic performance. If the student meets the conditions of the contract, and the term and cumulative GPA are at least 2.00, the student will be removed from probation. If the contract conditions are met but the cumulative GPA is still less than 2.00, the student will remain on probation. If the conditions are not met, the student will be suspended.

A student will be allowed to earn no more than two D grades in rotations. If a grade of D is earned for a third time in the clinical year (on the same or different rotations), the student will be dismissed from the curriculum.

A student earning a D in a required (core or track) **rotation** must repeat that rotation and earn a grade of at least C before graduating. If the rotation is not available, the student must bring an alternative plan to the ASSC for approval.

A student earning a D in an elective **rotation** must retake that rotation. If the student wishes to take an additional rotation in the same subject area instead, he or she must petition the ASSC for approval. In either case, the student must earn a grade of at least C.

A student earning an F in a rotation (required or elective) may be dismissed from the curriculum. The student will first be referred to the associate dean for academic and student affairs. Cases will then be presented to the SPC for consideration. If the circumstances leading to the F are egregious (significant disregard for standards of professional behavior; inappropriate behavior that places either animals or people at significant risk of injury or death), the student may be dismissed. Otherwise, the student will need to prepare a plan for improvement and present it to the associate dean for academic and student affairs. The student will then bring the plan before the SPC, which will consider the plan and prepare a contract for academic performance. The student will not be allowed to continue in the curriculum until the remediation plan is successfully completed.

A second F in any rotation will result in dismissal from the curriculum.

When a student repeats a course in which a D or F is earned, (a) both grades for the course shall appear on the official transcript and (b) only the last enrollment for the course shall count in the student's grade point average.

*Any student required to repeat a course or rotation or take an additional course or rotation will be charged the appropriate tuition and fees.*

## **D.V.M. Readmission**

As a D.V.M. student, if you're dropped from the program, you need permission of the SPC to be reinstated.

Credits earned at other institutions during suspension will not apply toward graduation from the University unless advance permission is received from the SPC. Readmission to the college is at the discretion of the SPC with consent of the faculty.

If readmission is granted, the SPC will determine the courses to be repeated and the level of performance that must be achieved. Failure to achieve these requirements will result in permanent dismissal from the professional curriculum. If permitted to return, you will be placed on probation and may be dropped at any time if your work is unsatisfactory.

## **E-Mail: the University's Official Means of Communication**

Students are responsible for all information sent via their University e-mail account. Students who forward their University e-mail account are still responsible for all information, including attachments, sent to the account

## **Equal Opportunity**

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Inquiries regarding compliance may be directed to  
Director  
Office of Equal Opportunity and Affirmative Action  
University of Minnesota  
274 McNamara Center  
200 Oak Street S.E.  
Minneapolis, MN 55455  
612-624-9547  
eoaa@umn.edu  
www.eoaffact.umn.edu

## **Equipment**

As a D.V.M. student, you will be required to have a laptop computer that meets minimum specifications announced at the time of admission. In addition to a computer and textbooks, you'll need to purchase certain special items of clothing, some medical instruments, and other learning tools.

## **Grading and Transcript Policy**

The University has two grading systems, A-B-C-D-F (with pluses and minuses) and S-N. You may receive grades only from the grading system under which you have registered for a course.

Each campus, college and department determines to what extent and under what conditions each grading system is used, may specify what courses or proportion of courses must be on one system or the other, and may limit a course to either system.

The University's official transcript, the chronological record of your enrollment and academic performance, is released by the University only at your request or in accordance with state or federal statutes; mailed copies have the University's official seal printed on them. You may obtain an unofficial transcript, except when you have a transcript hold on your record.

To learn more about grading and transcript policies, go to <http://onestop.umn.edu>.

## **Grievance Procedures**

Grievances or appeals may be filed through procedures that conform to the principles of fairness and accessibility defined in the University Senate Statement on Academic Freedom and Responsibility. Grievances must be presented in accordance with the regulations of the University Senate and the procedures established by the college. Grades are determined by the course coordinator and department chair and are not grievable

## **Immunization**

Students born after 1956 who take more than one University class are required under Minnesota law to submit an Immunization Record.

## **Registration**

If you're a D.V.M. student you'll receive complete registration information from the Office of Academic and Student Affairs each term.

If you've completed a course or courses similar or identical to those required in the D.V.M. curriculum, you can petition the Admissions Committee to substitute for that requirement. Forms for this are available in the Academic and Student Affairs Office, 108 Pomeroy Center.

M.S/Ph.D. students will register online each term according to the requirements of their program and the Graduate School.

# Course Descriptions

## Course Symbols

- ..... The comma, used in prerequisite listings, means "and."
- § ..... Credit will not be granted if credit has been received for the course listed after this symbol.
- ¶ ..... Concurrent registration is required (or allowed) in the course listed after this symbol.
- # ..... Approval of the instructor is required for registration.
- % ..... Approval of the department offering the course is required for registration.
- ..... Approval of the college offering the course is required for registration.
- DGS.... Director of Graduate Studies.
- A prerequisite course listed by number only (e.g., prereq 5246) is in the same department as the course being described.

A class rank prerequisite (e.g., 3rd yr) states the minimum class standing a student must hold to register for a course without special permission from the Academic Standing Committee.

## Comparative and Molecular Biosciences (CMB)

**CMB 5180. Ecology of Infectious Diseases.** (3 cr; A-F only. \$PUBH 6180. Prereq-MVB or CMB or VMed grad student or #) Ways in which host, agent, and environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/control, evolution of virulence, analytical/molecular tools.

**CMB 5200. Statistical Genetics and Genomics.** (4 cr; A-F or Aud. \$ANSC 5200) Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis using pedigree data for codominant/dominant markers. Using radiation hybrid mapping and single cell typing. Design issues in linkage analysis, parentage testing, and marker polymorphism.

**CMB 5335. Molecular Biotechnology Laboratory for the Novice.** (2 cr; S-N only) Five day course. Understanding/applying basic concepts of biotechnology. Lectures, hands-on lab experiments.

**CMB 5381. Pathogenesis of Infectious Zoonotic Diseases.** (3 cr; A-F only. Prereq-[Microbiology, biochemistry] courses or #) Introduction to mechanisms of transmission/pathogenesis for zoonotic infectious diseases. Lectures, review of current literature, student presentations, written reports.

**CMB 5594. Directed Research in Comparative and Molecular Biosciences.** (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-Jr) Independent study as determined by instructor. Usual activity includes conduct of research in instructor's lab.

**CMB 5910. Grantwriting: What Makes a Winning Proposal.** (1 cr; S-N or Aud. \$VMED 5910) Components of a strong proposal. Grant submission process. What reviewers look for. How to locate grant announcements that match research interests.

**CMB 8100. Research Rotation in Comparative and Molecular Biosciences.** (4 cr [max 8 cr]; A-F or Aud. Prereq-1st yr CMB grad student) Directed research lab rotations. Experimentation, supplemental reading, research presentations under guidance of faculty member who is potential thesis adviser. Taught by program faculty.

**CMB 8134. Ethical Conduct of Animal Research.** (3 cr; A-F or Aud. \$ANSC 8134, VMED 8134. Prereq-[Grad or professional school] student or #) Ethical considerations in the use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

**CMB 8201. Mechanisms of Animal Health and Disease I.** (3 cr; A-F or Aud. Prereq-1st yr CMB grad student or approval of crse coordinator) Basic mechanisms of animal health. Innate/acquired immunity. Immune avoidance. Cellular basis for pathogenesis of animal diseases. Molecular/genetic mechanisms of host resistance. Host/pathogen interactions.

**CMB 8202. Mechanisms of Animal Health and Disease II.** (3 cr; Stdnt Opt. Prereq-8201) Multi-perspective approach to critically evaluating journal articles, as done for peer-reviewed journals. Aspects of host/pathogen interactions, including molecular/genetic mechanisms of host resistance and pathogenesis.

**CMB 8303. Comparative Models of Disease.** (2 cr; A-F only. Prereq-Enrollment in a biological sciences grad program or #) Disease processes in organ systems. Examples of animal models. Comparative medicine. Clinical relevance of problem/disease. Animal models used to study disease process/problem. Lectures.

**CMB 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**CMB 8335. Molecular Biology Techniques.** (3 cr; Stdnt Opt. \$ANSC 8131. Prereq-Biol 5001, Biol 5003 or equiv or #) Basic theory and current methodologies of molecular biology and recombinant DNA technology. Lab work includes DNA and RNA hybridization, gene transfer, and polymerase chain reaction techniques. Primarily for students with limited exposure to molecular biology.

**CMB 8344. Mechanisms of Hormone Action.** (2 cr; Stdnt Opt. Prereq-Course in biochemistry or cell biology or #) Mechanisms of hormone/cytokine action. Focuses on major signal transduction/apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature.

**CMB 8361. Neuro-Immune Interactions Inter.** (3 cr; Stdnt Opt. \$NSC 8026, PHCL 8026, PSY 8026. Prereq-[MicB 5218 or equiv], [NSc 5561 or equiv]) Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Course is offered fall of even-numbered years.

**CMB 8371. Mucosal Immunobiology.** (3 cr; A-F or Aud. \$MICA 8371, OBIO 8371. Prereq-MICa 8001 or equiv or #) Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal.

**CMB 8394. Research in Comparative Biomedical Sciences.** (1-6 cr [max 18 cr]; Stdnt Opt. Prereq-Grad CMB major) Directed research determined by student's interests, in consultation with faculty mentor.

**CMB 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**CMB 8481. Advanced Neuropharmaceutics.** (4 cr; A-F or Aud. \$NSC 8481, PHM 8481. Prereq-#) Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS.

**CMB 8550. Comparative and Molecular Biosciences Seminar.** (1 cr [max 8 cr]; S-N or Aud. Prereq-Biol sciences grad student) Student/faculty presentations of their own research or a directed topic.

**CMB 8560. Research and Literature Reports.** (1 cr [max 8 cr]; S-N or Aud. Prereq-Grad CMB major or #) Current developments in cellular and molecular mechanisms of animal health and disease.

**CMB 8570. Comparative Biomedical Sciences Seminar.** (1 cr [max 8 cr]; S-N or Aud. Prereq-Biol sciences grad student) Weekly seminar by primarily outside speakers discussing current issues.

**CMB 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**CMB 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**CMB 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Veterinary and Biomedical Sciences (VBS)

**VBS 2032. General Microbiology With Laboratory.** (4 cr; Stdnt Opt. §BIOL 2032, MICB 3301. Prereq-[CHEM 1011, one semester college biology] or #; primarily for non-microbiology majors) Principals of microbiology. Bacterial metabolism, growth/genetics, biology of viruses/fungi. Control of microorganisms. Host-microbe interactions, microorganisms/disease, applied microbiology.

**VBS 8700. Seminar: Veterinary Pathobiology.** (1 cr [max 5 cr]; Stdnt Opt)

## Veterinary Clinical Sciences (VCS)

**VCS 3050. Perspectives: Interrelationships of People and Animals in Society.** (2 cr; Stdnt Opt. §CVM 6050, UC 4301) Interrelationships of people/animals. Social, economic, health consequences. Pets/people sharing urban environment, animal rights, influence of cultural differences on animal-human relationships.

**VCS 4600. Small Animal and Equine Behavior.** (3 cr; A-F or Aud) Basics of normal animal behavior, ethology, and welfare in cats, dogs, and horses. Common behavioral problems. Approaches to prevent/treat them, including pre-purchase considerations, management, and housing. Principles of behavior modification.

**VCS 4606. Small Animal Management.** (3 cr; A-F or Aud) Husbandry, anatomy/physiology, common disease conditions of dogs/cats. Small mammals, reptiles, caged birds. Career opportunities in fields dealing with small animals, regulatory aspects, animal rights, state/federal legislation concerning animal and public health issues. Lectures, demonstrations. Lectures taught by CVM faculty members and outside contractors. Student performance judged by tests and several group projects.

## Veterinary Medicine (CVM)

**CVM 6000. Orientation to Veterinary Medicine.** (3 cr; S-N or Aud. Prereq-CVM 1st yr or CVM transfer) Introduction to academic and professional skills necessary for success in the veterinary curriculum and profession. Three-day pre-class orientation. Peer and faculty mentorship network.

**CVM 6001. Opportunities in International and Cultural Immersion.** (.5 cr [max 1 cr]; S-N only) Finding and applying for opportunities. Securing funding. Travel safety. Topics in cultural competence. Presentations from students who have participated in international projects.

**CVM 6005. Interprofessional Ethics Education.** (1 cr [max 2 cr]; S-N only. Prereq-AHC student) Introduction to concepts/methods in health care ethics through online modules. Facilitated interprofessional small group discussions of case narratives. Concepts/methods that are relevant across health professions.

**CVM 6011. Professional Development I: Transitioning to the Veterinary Profession .** (2 cr; S-N or Aud. Prereq-DVM 1st yr) Introduction to professional life as a veterinarian. Personal finance, licensure, team building, personal leadership, self management.

**CVM 6012. Professional Development II: Clinical Communication.** (2 cr; S-N only. Prereq-DVM 1st yr or #) Integrates subjects in veterinary professional curriculum. Introduction to and practice of professional skills. Communication, ethics, teamwork, leadership.

**CVM 6013. Professional Development III: Applied Communication.** (2 cr; S-N only. Prereq-DVM 2nd yr or #) Growth of veterinary professional with in the larger community. Developing communication skills. Working with the elderly and children. Participation/observation at veterinary practice.

**CVM 6014. Professional Development IV: Thinking Like a Doctor.** (2 cr; S-N only. Prereq-DVM 2nd yr or #) Integrates subjects in veterinary professional curriculum. Introduction to and practice of professional skills. Communication, ethics, teamwork, leadership.

**CVM 6021. Overview of Animal Populations .** (1 cr; S-N or Aud. Prereq-DVM 1st yr or #) U.S. production animal agriculture at individual producer level. Roles veterinarians play.

**CVM 6026. Small Animal ICU Practicum: Year 4.** (1 cr [max 3 cr]; S-N or Aud) Management of dogs/cats requiring urgent medical care, intensive medical management. Providing primary case support through patient evaluation, problem solving, health care delivery, equipment operation. Practicum in Small Animal Intensive Care Unit.

**CVM 6027. Large Animal Practicum: Year 3.** (1 cr; S-N or Aud. Prereq-3rd DVM or [#; □]) Experience in procedures/policies involved in after-hours care of hospitalized/emergency cases in the large-animal hospital.

**CVM 6028. Large Animal Hospital Practicum: Year 4.** (4 cr [max 12 cr]; S-N or Aud. Prereq-Required for all 4th year students in Large Animal Track) Experience in team leadership in procedures/policies involved in after-hours care of hospitalized/emergency cases in large-animal hospital.

**CVM 6029. Small Animal Hospital Practicum.** (1 cr [max 2 cr]; S-N only. Prereq-DVM 3rd yr or #) Management of dogs/cats requiring urgent medical care, intensive medical management. Providing primary case care and service support through patient evaluation, problem solving, health care delivery, equipment operation. Practicum is served in Small Animal Intensive Care Unit.

**CVM 6030. Veterinary and Community Public Health.** (2 cr; A-F or Aud. Prereq-6201, 6202, 6220) Epidemiological approach to veterinary public health. Major zoonoses, animal sentinels, meat/milk inspection, preharvest food safety, environment, occupational health/safety, euthanasia, carcass disposal methods, cruelty investigations, welfare issues. Problem-solving examples.

**CVM 6031. International Animal Diseases.** (1 cr [max 2 cr]; S-N or Aud. Prereq-DVM, [CVM grad student or #]) Epidemiology, clinical signs, differential diagnoses, pathology, economic effect of diseases not currently or intermittently present in the United States. International role of veterinarians in controlling disease, increasing food production, facilitating trade.

The professors are enthusiastic and invested in our success. I appreciate that most of the Clinicians and staff are so open to ask questions or explain concepts. I've had a good overall learning experience.

Holly

**CVM 6032. International Animal Diseases: The Public Health Perspective.** (1.5 cr; S-N only. Prereq-3rd yr DVM or #) Epidemiology, clinical signs, differential diagnoses, pathology, economic effect of diseases not currently, or only intermittently present, in the United States. International role of veterinarians in controlling disease, increasing food production, facilitating trade.

**CVM 6042. Practice Management/Law and Ethics.** (2 cr; S-N or Aud. Prereq-DVM or #) Economic, marketing, personnel management, accounting issues in veterinary practice management. Legal/ethical parameters for veterinary practice. Attendance required.

**CVM 6046. Practice Readiness I.** (2 cr [max 8 cr]; S-N or Aud. Prereq-[3rd or 4th] yr DVM or #) Well pet care, practice options, teamwork, economic impact. Preventive care for all life stages, including pet selection, dental prophylaxis/immunizations. Wellness concept, framework for euthanasia appointment, customer service, veterinary/team roles. Lengthening well lives of pets. Legislative process: how veterinary/professional organizations can be involved. Selecting a practice. Resume, interview skills. Professional dress code.

**CVM 6050. Animals and Society: A Paradox of Values.** (2 cr; A-F only. §UC 4301, VCS 3050) Interrelationships of people/animals, social/economic. Issues that arise related to animals. Human/animal health/welfare concerns, public policy.

**CVM 6100. Veterinary Gross Anatomy.** (5 cr [max 6 cr]; A-F or Aud. Prereq-DVM 1st yr or #) Gross anatomy of domesticated mammals, including development anatomy. Carnivore portion features dog as a model animal and comparatively the cat. Ungulate portion focuses on basic equine anatomy and includes clinically important ruminant/swine anatomy.

**CVM 6101. Normal Radiographic Anatomy.** (1 cr; A-F or Aud. Prereq-1st yr DVM or #) Introduction to radiological principles. Radiation safety, radiographic technique, patient positioning. Emphasizes mastery of normal radiographic anatomy. Identifying anatomic structures on normal plain films and on special-contrast procedure radiographs. Lectures, guided laboratory exercises.

**CVM 6102. Veterinary Imaging Part 1.** (2 cr; A-F or Aud. Prereq-[6100, 6101, 2nd yr DVM] or #) Introduction to physics of radiology; Radiographic principles/techniques. Cardiopulmonary/Urogenital systems. Emphasizes interpretation of radiographs (film or digital) germane to common animal diseases. Clinical applications. Lectures, lab exercises using body systems approach to imaging (primarily radiographic) of large/small animals.

**CVM 6103. Veterinary Imaging Part 2.** (2 cr; A-F or Aud. Prereq-[6100, 6101, 6102, 3rd yr DVM] or #) Musculoskeletal, general abdomen, and alimentary tract systems. Emphasizes interpretation of radiographs (film or digital) germane to common animal diseases. Clinical applications. Lectures, lab exercises using body systems approach to imaging (primarily radiographic) of large/small animals.

**CVM 6104. Small Animal Special Procedures in Radiology: Advanced Block.** (1 cr; S-N or Aud. Prereq-[3rd or 4th] yr DVM or #) Common contrast studies used in small animal practice.

**CVM 6105. Small Animal Ultrasonography.** (1 cr [max 2 cr]; S-N or Aud. Prereq-[6100, 6101, 6102, 6103, 3rd yr DVM student] or #) Body systems approach to imaging (primarily abdominal) of small animals. Ultrasonographic physics/technique, normal anatomy. Portal vein-associated organs, general abdomen (masses, effusions, tissue echogenicity, bowel). Upper/lower urinary tracts, genital tract, echocardiography. Head/neck ultrasound (eye, thyroid, etc.). Background of image generation/interpretation of sonograms germane to common animal diseases.

**CVM 6110. Veterinary Physiological Chemistry.** (3 cr; A-F or Aud. Prereq-DVM 1st yr or grad student in biological or biomedical sciences) Mechanisms by which animals digest, absorb, and metabolize carbohydrate, protein, lipid, and nucleic acids. Use of metabolic energy to maintain physiological processes. How metabolic end products are created/eliminated. Hormones and intracellular signaling. Genome, protein synthesis, regulation of gene expression. Comparative biochemistry.

**CVM 6111. Histology.** (3 cr; A-F or Aud. Prereq-DVM 1st yr or #) Introduction to light/electron microscopic structure of cells, tissues, and certain organs. How cells associate to perform specialized functions. How organized groups of cells (i.e., tissues) are arranged to form organ systems of the body.

**CVM 6112. Organology.** (3 cr; A-F or Aud. Prereq-[6111, DVM 1st yr] or #) Microscopic/ultrastructural morphology of organ systems (cardiovascular, gastrointestinal, respiratory, urinary, endocrine) in mammalian domestic species.

**CVM 6120. Veterinary Neurobiology.** (2 cr; A-F or Aud. Prereq-DVM 1st yr or #) Anatomy and physiology of central nervous system (brain, spinal cord) and special senses (eye, ear, olfaction, taste).

**CVM 6130. Veterinary Physiology.** (6 cr; A-F only. Prereq-DVM 1st yr or #) Major organ systems (neural, muscle, cardiac, vascular, respiratory, gastrointestinal, renal, endocrine) physiology. Neural, endocrine, and paracrine regulatory systems. Relationships between organ systems illustrate integrative mechanisms for homeostasis.

**CVM 6132. Reproductive Biology.** (2 cr; A-F or Aud. Prereq-DVM 2nd yr or #) Physiology of reproduction, including lactation.

**CVM 6134. Principles of Veterinary Nutrition.** (2 cr; A-F or Aud. Prereq-DVM 1st yr or #) Major classes of nutrients. Role of specific deficiencies and excesses in disease. How domestic species are fed, differences in nutrition/feeding. Role of nutrition in a systemic physiologic/pathologic process. Interface between veterinary profession and feed/food production systems.

**CVM 6136. Small Animal Nutrition: Advanced Block.** (2.5 cr; Stdnt Opt. Prereq-3rd yr DVM or #) Clinical application in nutrition competencies expected of a practicing small or mixed animal veterinarian. Feeding of healthy pets. Nutritional assessment. Formulating a nutritional management plan for patients.

**CVM 6137. Small Animal Clinical Nutrition.** (2 cr [max 6 cr]; A-F only. Prereq-3rd or 4th yr DVM or #) Students participate in clinical nutrition service of VMC, manage nutritional needs of patients, perform nutritional assessments of ICU patients, perform internal/referring nutritional consults, and see outpatient appointments.

**CVM 6141. General Veterinary Pharmacology.** (2 cr; A-F or Aud. Prereq-DVM 1st yr or #) Medical considerations for use of drugs in animals. Pharmacology of anti-allergy/inflammatory drugs. Mechanisms and therapeutic uses of drugs affecting autonomic nervous system, cardiovascular system, respiratory/digestive tracts, and kidneys.

**CVM 6142. Veterinary Neuropharmacology.** (1 cr; A-F or Aud. Prereq-DVM or #) Pharmacology of drugs that have a major effect on the central nervous system: absorption, distribution, metabolism, and excretion; major mechanisms of action; clinical usefulness; side effects; drug interactions.

**CVM 6195. Veterinary Toxicology.** (3 cr; A-F or Aud. §TXCL 5195. Prereq-3rd yr DVM or #) Toxicology of minerals, pesticides, venoms, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisons.

**CVM 6201. Host Defenses.** (2 cr [max 4 cr]; A-F or Aud. Prereq-DVM 1st yr or #) Cells/molecules involved in protection against infectious agents/cancers. Innate/adaptive immunity. Differentiation and function of lymphocytes. Biochemical immunity/immune-mediated pathologies.

**CVM 6202. Infectious Agents: Parasitology.** (4 cr [max 7 cr]; A-F or Aud. Prereq-DVM 2nd yr or #) Systematic and biologic study of protozoan, arthropod, and helminth parasites of animals. Emphasizes relationships to diseases and principles of parasite control.

**CVM 6203. Infectious Agents: Bacteriology.** (3.5 cr; A-F or Aud. Prereq-DVM 2nd yr or #) Veterinary medical microbiology/mycology. Mechanisms of pathogenesis, clinical presentations, diagnostic approaches, host responses to infectious challenge. Prevention, treatments. Laboratory exercises are used to test students' ability to isolate/define potential bacterial pathogens.

**CVM 6204. Infectious Agents: Virology.** (3 cr; A-F or Aud. Prereq-DVM 2nd yr or #) Concept of viruses that affect animal species of veterinary significance. How virus/host factors interact. How these interactions lead to disease or recovery. Applications to prevention/management of disease. Mechanics of virus-host interactions in important viral diseases. Using literature to solve virological problems and evaluate strategies for controlling viral diseases.

**CVM 6205. Infectious Agents: Pharmacology.** (1.5 cr; A-F or Aud. Prereq-DVM 2nd yr or #) Clinical pharmacology of anti-microbial, antifungals, and anthelmintics used in veterinary medicine. Mechanisms of action, development of resistance and comparative anti-microbial spectrum of agents in their drug classes, and toxicities associated with use, and ways to minimize these.

**CVM 6211. Applied Veterinary Genetics.** (1 cr; A-F or Aud. Prereq-1st yr DVM or #) Overview of general, molecular, and cytogenetics relevant to animal health, disease, breeding, and production. Emphasizes how genetic information is acquired/used in veterinary medicine and animal agriculture.

**CVM 6220. Clinical Epidemiology.** (1.5 cr; A-F only. Prereq-DVM 2nd yr or #) Statistical and epidemiological concepts applied to veterinary medicine.

**CVM 6222. Advanced Clinical Epidemiology.** (1 cr [max 2 cr]; A-F only) Students apply epidemiologic principles to control of infectious diseases in animal populations. Review of scientific literature. Global impacts of infectious diseases. Diagnostic tests, disease outbreak investigation, economics of disease control/surveillance.

**CVM 6298. Basic Pathology.** (2 cr [max 4 cr]; A-F only) Mechanisms in reactions of cells/tissues to injury. Retrogressive changes in cells, cell death, pigments, circulatory disturbances, inflammation, alterations of cell growth (including neoplasia). Applications to evaluation of gross and microscopic tissue alterations.

**CVM 6299. Systemic Veterinary Pathology.** (5 cr [max 10 cr]; A-F only) Reactions of specific organ systems to injury. Mechanisms of disease for more or less well defined stimuli. Applications to diagnosis of specific diseases at gross/microscopic level.

**CVM 6301. Clinical Skills I.** (1 cr; A-F or Aud. Prereq-DVM 1st yr or #) Domestic animal behavior. Basic large animal handling/management skills. Clerk duty in large-animal hospital is required. First of five-part series.

**CVM 6302. Clinical Skills II.** (1 cr; A-F or Aud. Prereq-DVM 1st yr or #) Domestic animal behavior. Basic small animal handling/management skills. Introduction to hospital. Small-animal clerk duty is required.

**CVM 6303. Clinical Skills III.** (1 cr; S-N or Aud. Prereq-DVM 2nd yr or #) Domestic animal behavior. Basic animal handling and management skills.

**CVM 6304. Clinical Skills IV.** (1 cr; S-N or Aud. Prereq-DVM 2nd yr or #) Domestic animal behavior. Basic animal handling and management skills.

**CVM 6305. Clinical Skills V.** (1 cr; S-N or Aud. Prereq-DVM 3rd yr or #) Domestic animal behavior. Basic animal handling/management skills. Small-animal clerk duty is required. Using an IV/syringe pump, setting up ICU order sheets, using glucometer/centrifuge to perform "big 4" daily ICUC tests.

**CVM 6306. Small Animal Clinical Skills: Advanced Block.** (1 cr; S-N or Aud. Prereq-[3rd or 4th] yr DVM or #) Advanced clinical skills used by small animal practitioners in private practice.

**CVM 6307. Clinical Skills Elective.** (1 cr [max 2 cr]; S-N only. Prereq-[6301, 6302] or #) Hands-on clinical skills. History taking, physical exam, basic/intermediate technical procedures on small animals. Skills are practiced at several approved locations.

**CVM 6312. Veterinary Dental Rotation (SDen).** (2 cr [max 6 cr]; A-F only. Prereq-DVM 3rd or 4th yr student or #) Routine/complex dental problems. Students diagnose and formulate treatment plans. Hands-on training. Basic periodontal procedures, single/multi-rooted extractions, dental radiographic techniques, instrument/equipment care, dental charting.

**CVM 6321. Surgery, Anesthesiology, Critical Care.** (4 cr; A-F or Aud. Prereq-DVM 2nd yr or #) Introduction to principles/techniques for conducting surgical procedures, managing uncomplicated anesthesia, and providing critical care for common situations in large/small animal species.

**CVM 6400. Skin and Adnexa.** (3 cr; A-F or Aud. Prereq-DVM 2nd yr or #) Structure/function of skin/adnexa. Clinical signs, diagnosis, histopathologic reaction patterns, and treatment of various dermatologic conditions that affect small and large animals.

**CVM 6404. Small Animal Dermatology: Advanced Block.** (1 cr; A-F or Aud. Prereq-[3rd or 4th] yr DVM or #) Case-base discussion of common dermatologic conditions that affect dogs/cats. Students work on clinical cases outside classroom. Cases are discussed in classroom.

**CVM 6410. Large Animal Digestive Disorders.** (2 cr [max 4 cr]; A-F or Aud. Prereq-DVM 3rd yr or #) Digestive disorders of domestic large animal species, beginning with oral cavity. Pathogenesis, clinical signs, diagnosis, treatment, prevention. Case examples, lab exercises.

**CVM 6411. Small Animal Gastroenterology.** (3 cr; A-F only. Prereq-DVM 3rd yr or #) Important gastrointestinal (GI) diseases of dogs/cats. Oral cavity (dentistry), esophagus, intestines, liver, biliary tract, pancreas. Obtaining an appropriate history for dogs/cats with GI disorders. Common GI disorders. Therapy/prognosis. How to formulate an appropriate set of differential diagnoses and diagnostic plan.

**CVM 6414. Small Animal Liver/Pancreas Disorders: Advanced Block.** (1 cr; A-F or Aud. Prereq-[3rd or 4th] yr DVM or #) Complicated diabetes mellitus, feline pancreatitis, and hepatic encephalopathy in dogs/cats. Lectures, small-group exercises.

**CVM 6416. Small Animal Gastrointestinal Endoscopy.** (.5 cr; Stdnt Opt. Prereq-[3rd or 4th] yr DVM or #) Endoscopic diagnosis/treatment of small animal diseases.

**CVM 6420. Musculoskeletal System Diseases.** (2 cr; A-F or Aud. Prereq-DVM 3rd yr or #) Presentation, pathophysiology, diagnostic, and therapeutic/management approaches for common disorders of locomotion.

**CVM 6424. Small Animal Orthopedic: Advanced Block.** (1 cr; A-F or Aud. Prereq-[3rd or 4th] yr DVM or #; non-track students may audit lectures, but labs must be taken for grade) Dog/cat pediatric, adult orthopedic problems frequently seen in clinical practice. For comparative information, selected human orthopedic problems are presented by guest lecturers. Attendance/participation required for grade.

**CVM 6430. Cardiopulmonary System Disorders.** (4 cr; A-F or Aud. Prereq-DVM or #) Pathophysiology, presentation, diagnostic presentation, therapeutic approaches, and management protocols for common disorders of the cardiovascular and pulmonary systems.

**CVM 6434. Critical Care: Advanced Block.** (1 cr; S-N or Aud. Prereq-[3rd or 4th] yr DVM or) Case-based discussions of common emergencies: trauma, toxins, acute abdomen, hematologic, respiratory. Emergency procedures, intensive care monitoring, blood gas interpretation. Sepsis, related inflammatory response. Cardiopulmonary resuscitation.

**CVM 6436. Small Animal Cardiology: Advanced Block.** (1 cr; A-F or Aud. Prereq-[3rd or 4th] yr DVM or #) Diagnostic/therapeutic considerations related to small animal cardiovascular disorders beyond core in preparation for clinical rotations.

**CVM 6440. Nervous System Disorders.** (2 cr; A-F or Aud. Prereq-DVM 3rd yr or #) Pathophysiology, presentation, diagnostic approach, therapeutic approach, and management protocol for common neurologic disorders in domestic species.

**CVM 6441. Behavior Core.** (2 cr; A-F or Aud. Prereq-3rd yr DVM student or #) Ethology, small/large animal behavior, human-animal bond, behavior medicine, psychopharmacology, behavior genetics, learning theory, behavior modification.

**CVM 6442. Animal Behavior Elective: Advanced Block.** (1 cr; S-N or Aud. Prereq-[3rd or 4th] yr DVM or #) Introduction to abnormal/undesired animal behavior, diagnostic procedures, and behavioral/pharmacological modifications.

**CVM 6444. Ophthalmology.** (2 cr; A-F or Aud. Prereq-[3rd or 4th yr] DVM or #) Common procedures for evaluation, diagnosis, treatment of eye disorders in domestic species.

**CVM 6451. Metabolic Disorders.** (3 cr; A-F or Aud. Prereq-DVM 3rd yr or #) Endocrine/metabolic diseases of all species. Unique metabolic problems of large animals. Pediatrics/geriatrics of companion animals. Oncological diseases of companion/large animals.

**CVM 6452. Metabolic Disorders II.** (3 cr; A-F or Aud. Prereq-DVM 3rd yr or #) Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocols for metabolic and endocrine based disorders of domestic species.

**CVM 6460. Urinary System Disorders.** (2 cr; A-F or Aud. Prereq-2nd yr DVM or #) Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocol for common disorders of the urinary system in domestic species.

**CVM 6461. A Clinician's Analysis of Urinalysis.** (1 cr; S-N or Aud. Prereq-3rd yr DVM or #) Informal, case-based, interactive, in-depth approach to evaluation of urinalyses of clinical cases recently admitted to Veterinary Teaching Hospitals. Improving observational/interpretation skills. Recognizing invitro factors that may alter results of urinalyses.

**CVM 6464. Small Animal Urinary System Disorders: Case Based Discussion.** (1 cr; S-N or Aud. Prereq-[3rd or 4th] yr DVM or #) Expands on disorders of small animal urinary system. Introduction to core/additional disorders.

**CVM 6470. Multisystemic Diseases.** (3 cr; A-F or Aud. Prereq-DVM 3rd yr or #) Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocol of disorders of the immunologic and hematologic systems and of multisystemic infectious diseases.

**CVM 6471. Problems in Small Animal Medicine.** (1 cr; A-F or Aud. Prereq-6410 or #) Problem-oriented approach to canine/feline cases with medical problems. Emphasizes using resources to develop an assessment for a problem, communicating assessment in writing, and developing a plan based on differential diagnoses.

**CVM 6472. Small Animal Infectious Diseases.** (1 cr [max 2 cr]; A-F only) Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocol of disorders of multisystemic infectious diseases of dogs and cats.

**CVM 6473. Large Animal Infectious Diseases.** (1 cr [max 2 cr]; A-F only) Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocol of disorders of multisystemic infectious diseases of ruminants and horses.

**CVM 6474. Immunological Diseases.** (1 cr [max 2 cr]; A-F only) Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocol of disorders of immunologic/hematologic systems.

**CVM 6480. Obstetrics.** (1 cr; A-F or Aud. Prereq-2nd yr DVM or #) Diagnosis/management of reproductive diseases.

**CVM 6481. Obstetrics Lab.** (1 cr; A-F or Aud) Techniques for pregnancy diagnosis, obstetric manipulation in large animal species.

**CVM 6482. Reproductive Diseases of Small Animals.** (1-2 cr [max 2 cr]; A-F or Aud. Prereq-3rd yr DVM or #) Physiology/pathology of reproduction, artificial insemination, abortive diseases, postpartum injuries, and breeding management in small animals, horses, and small ruminants. Students focus on 1-3 species. At least 10 hours per credit.

**CVM 6483. Reproductive Diagnostic Techniques.** (1 cr; A-F or Aud. Prereq-3rd yr DVM or #) Obstetric manipulation in domestic species.

**CVM 6494. Small Animal Anesthesia Advanced Block Core.** (1 cr; Stdnt Opt. Prereq-3rd yr DVM or #) Sedative techniques, combination injectable anesthesia, pediatric/geriatric small animal anesthesia, pain control, regional techniques, anesthesia in trauma cases, complications in anesthesia, ventilator use.

**CVM 6495. Non-Traditional Pet Core.** (1 cr; A-F or Aud. Prereq-3rd yr DVM or #) General/reproductive biology, behavior, husbandry, nutrition, handling, restraint, anesthesia. Common diseases, their treatments. Research animal issues. Special considerations of species commonly encountered in small/mixed animal practices (mice, rats, hamsters, gerbils, guinea pigs, chinchillas, rabbits, ferrets, basic aquarium species).

**CVM 6497. Avian Medicine and Surgery: Advanced Block.** (1 cr Prereq-[3rd or 4th yr] DVM or #) Bacterial, viral, fungal, parasitic diseases of companion birds. Caged birds, psittacines, raptors, racing pigeons, waterfowl. Behavioral components of common management problems (screaming, biting, feather picking, pathological bonding). Clinical methods of capture/restraint, anesthesia, radiology. Collecting samples for lab analysis. Overview of problems managed surgically.

**CVM 6498. Food Animal and Exotic Large Animal Anesthesia.** (.5 cr; A-F or Aud. Prereq-[3rd or 4th yr] DVM or #) Restraint, sedation, immobilization of ruminants/pigs. Regional techniques, special considerations for anesthesia. Injectable food animal anesthesia, anesthesia of llamas, ostriches, elk, other exotic large animal species.

**CVM 6500. Veterinary Public Health.** (1 cr [max 2 cr]; A-F only. Prereq-DVM 3rd or 4th yr or grad student or #) Interacting with public health, regulatory, and community activities. Roles in food industry. Public/occupational health, environmental problems. Zoonotic disease problems, food safety, occupational safety/health, euthanasia, carcass disposal, reporting, epidemiologic investigations, animal transportation/control, emergency preparedness, USDA accreditation. Students select clinical case, prepare oral response to hypothetical questions, conduct occupational safety/hazard review, present findings.

**CVM 6501. Advanced Veterinary Public Health: Food Systems.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM or MPH or grad student or #) Systems used to raise livestock/poultry, deliver through markets to slaughter or processing facilities, and deliver to consumers. Methods to assess/mitigate risks. Emphasizes public health/food safety issues. Field trips, problem solving, assignments.

**CVM 6502. Necropsy.** (2 cr [max 40 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Students perform necropsies, collect tissues for lab analysis, interpret clinicopathologic findings, prepare reports on animals submitted to Veterinary Diagnostic Lab, apply basic/clinical science to diseases for animals and populations of animals. Students may participate in history taking. Case findings discussed daily. Student groups present case reports at weekly departmental seminar.

**CVM 6505. Topics.** (.5-8 cr [max 160 cr]; A-F or Aud. Prereq-#) Elective topics course.

**CVM 6506. Directed Studies in Large Animal Medicine (DistL).** (2 cr [max 40 cr]; S-N or Aud. Prereq-DVM 4th yr or #) Students, under guidance of a faculty member, conduct special project addressing an issue in large animal medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM's curriculum committee.

**CVM 6507. Directed Studies in Small Animal Medicine (DistS).** (2 cr [max 40 cr]; S-N or Aud. Prereq-DVM 4th yr or #) Students, under guidance of a faculty member, conduct special project addressing an issue in small animal medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM's curriculum committee.

**CVM 6508. Directed Studies: Pathobiology (DistB).** (2 cr [max 40 cr]; S-N or Aud. Prereq-DVM 4th yr or #) Students, under guidance of a faculty member, conduct special project addressing an issue in veterinary pathobiology. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM's curriculum committee.

**CVM 6509. Directed Studies: Diagnostic Medicine (DistD).** (2 cr [max 40 cr]; S-N or Aud. Prereq-DVM 4th yr or #) Students, under guidance of a faculty member, conduct special project addressing an issue in diagnostic medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by faculty adviser and approval by CVM's curriculum committee.

**CVM 6510. Master's Project: Public Health Practice.** (1-3 cr [max 9 cr]; S-N only. Prereq-DVM student or #) Directed field research. Original or secondary analysis of data sets related to public health practice.

I love all the opportunities we get for hands on experience here at Minnesota starting in the first year—Large Animal Hospital clerk duty, student organization wet labs, Small Animal Hospital ICU duty, colic team, and foal team. The faculty and clinicians are great too—always willing to answer questions and open to teaching whenever possible.

*Lindsay Vogt, Class of 2010*

**CVM 6515. Externship (Extern).** (2 cr [max 24 cr]; S-N or Aud. Prereq-DVM 3rd or 4th yr or #) Students spend two weeks/rotation in a practice or other professional setting.

**CVM 6516. Externship in Public Health Practice.** (1-3 cr [max 3 cr]; S-N only. §PUBH 7296. Prereq-DVM student or #) Directed field experience or clinical rotation/practicum in selected community or public health agencies/institutions. Integration of knowledge/skills in population science for public health.

**CVM 6519. Wildlife Rehabilitation Center Summer Internship.** (2 cr [max 4 cr]; A-F only. Prereq-DVM student or #) Clinical skills. Animal handling, examination, and treatment. Hands-on course. Oral presentation at conclusion.

**CVM 6525. Rotation at Other Institution (RAOI).** (2 cr [max 40 cr]; S-N or Aud. Prereq-DVM 4th yr or #) Students to spend one-six weeks in an organized program at another degree-granting institution, in an area either not offered at the University or in one that complements experience in a clinical rotation at the University.

**CVM 6526. Dermatology Rotation at Other Institution.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th year or #) Rotation through which students may take a required dermatology course at another accredited veterinary college.

**CVM 6527. Anesthesiology Rotation at Other Institution.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th year or #) Rotation offered allowing students to fulfill their anesthesiology rotation requirement at another accredited veterinary college.

**CVM 6528. Radiology Rotation at Other Institution.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th year or #) Radiology core rotation taken at another accredited veterinary college and used to meet core requirements.

**CVM 6529. Equine Medicine Rotation at Other Institution.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th year or #) Equine Medicine Rotation at another accredited veterinary college and used to meet a core medicine requirement.

**CVM 6530. Orientation to Clinical Rotations.** (1 cr [max 2 cr]; S-N only. Prereq-3rd yr DVM) Topics, issues, and procedures encountered during clinical rotations. Transition into clinics. Flow during rotations. Didactic lectures, group exercises, discussions. CVM/VMC policies/procedures, patient flow, SOAPs, discharges, admissions, ICU/wards, patient care, UVIS, client communications, infection control, safety, pharmacy, licensure, rotation expectations.

**CVM 6532. Clinical Laboratory Medicine (Labs).** (1 cr [max 2 cr]; A-F only. Prereq-DVM 3rd or 4th yr or #) One-week intensive rotation in veterinary clinical lab medicine. Hematology, cytology, clinical chemistry, endocrinology, microbiology. Sample submission. Lab test methodology. Didactic teaching, small group discussion, case-based/guided self-instruction, microscopy.

**CVM 6534. Veterinary Clinical Pathology.** (4 cr; A-F or Aud. Prereq-2nd year DVM student or #) Clinical pathology data generation, statistical concepts. Hematopoietic system, its evaluation using laboratory tests. Emphasizes interpretation of individual tests on biochemistry profile and how results guide diagnostic plan. Integration of clinical pathology data for a patient. How to distinguish between diseases with similar clinical or clinico-pathologic findings. Lecture, lab, small group discussion, homework.

**CVM 6540. Advanced Veterinary Toxicology.** (2-8 cr [max 40 cr]; S-N or Aud. Prereq-DVM 3rd or 4th yr or #) In-depth examination of toxins. Clinical, diagnostic, mechanistic, and therapeutic aspects of biotoxins, organic, and inorganic toxins that affect livestock, poultry, wildlife, and companion animals or that threaten public health.

**CVM 6545. Introduction to Regulatory Medicine.** (2-4 cr; A-F or Aud. §TXCL 5545. Prereq-DVM or #) Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market.

Thanks to the support of my amazing professors, clinicians, and fellow students, I know I will be a well-rounded veterinarian. I have been exposed to so many diverse opportunities, and I'm only in my second year! With so much behind me, and so much to look forward to, I have no doubt that the University of Minnesota was the best choice I could have made.

*Tamara, Class of 2011*

**CVM 6560. Public Health Issues and Veterinary Medicine Opportunities.** (1 cr [max 2 cr]; A-F only) Introduction to public health practice and veterinary medicine. Day-to-day work of public health professionals. Public health principles in context. Veterinary medicine related to public health research/practice. Students interact with advocacy groups, media, lobbyists, legislators, regulatory officials, industry leaders, and public health professionals.

**CVM 6601. Small Animal Internal Medicine.** (2 cr [max 8 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Primary case responsibility for wide range of clinical diseases. History taking, physical examination, problem definition, diagnostic/therapeutic plans on assigned cases. Cases typically relate to gastroenterology, urology/nephrology, oncology, neurology, immunology, and cardiology. Daily rounds. Students present case discussion topics and interpret lab data, radiographic evaluations, and biopsy information. Emphasizes effective communications with clients and with referring veterinarians.

**CVM 6602. Small Animal Internal Medicine: (SAM B).** (2 cr [max 52 cr]; Stdnt Opt. Prereq-[6601, [DVM 3rd or 4th yr]] or #) Problem-solving skills, clinical skills, communication skills, record keeping, ethical issues in referral cases. Methods of knowledge acquisition, including computerized searches and diagnostic programs. Small group rounds discussions. Students assist clinicians in management of referral/emergency cases. Cases typically related to gastroenterology, nephrology, urology, oncology, nutrition, neurology, and cardiology.

**CVM 6605. Banfield Elective Clinical Rotation.** (2 cr [max 4 cr]; A-F only) Managing general/clinical caseload in non-referral setting. Working with patients at Banfield, The Pet Hospital, under supervision of mentor. Managing acute/chronic cases. Client communication. Clinical skills.

**CVM 6606. Emergency Rotation.** (2 cr [max 20 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM or #) Evening/weekend ER service, day ER service. Medical/surgical emergency/traumatic cases. Students assist staff clinicians/interns in diagnosis and case management. Triage, history taking, physical exams, clinical problem solving, patient management. Students give presentation on a case they were involved in within rotation.

**CVM 6608. Critical Care.** (2 cr [max 20 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM or #) Primary case care for ICU patients. Some emergency receiving. Daily rounds, including case discussion and critical care topics. Limited case care responsibility, including SOAPs and treatment orders on existing patients. Students present a short rounds discussion on critical care topic of their choice.

**CVM 6630. Behavior (Beha).** (2 cr [max 8 cr]; Stdnt Opt. Prereq-DVM [3rd or 4th yr] or grad student or #) Students participate in behavior consultations: history taking, diagnosis, outline of treatment protocols, sample collection, demonstration of training techniques, writing of treatment plans, case follow-up. Students present one case, prepare one topic of their choice for presentation during rounds. Daily rounds include discussion of cases, review of behavior-related articles, discussion of problem complexes.

**CVM 6632. Dermatology (Derm).** (2 cr [max 20 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Routine dermatologic problems in companion animal practice. History taking, clinical diagnosis, patient management, client education. Students participate in all phases of diagnosis/management of cases. Small-group discussions.

**CVM 6634. Comparative Ophthalmology (Ophth).** (2 cr [max 40 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Entry-level ophthalmology. Diagnosis, treatment. Outside readings, review papers, final essay exam.

**CVM 6636. Cardiology (Card).** (2 cr [max 40 cr]; Stdnt Opt. Prereq-DVM 4th yr or CVM grad or #) Clinical problem solving. Cases of cardiopulmonary disease, including canine/feline congenital heart disease, acquired valvular/myocardial disease, dirofilariasis, arrhythmias, pulmonary disorders. Hands-on experience in conducting physical exams, recording electrocardiograms/echocardiograms, and reading thoracic radiographs. Group discussions, rounds.

**CVM 6644. General Practice (GenP).** (2 cr [max 40 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Students manage their own cases including developing diagnostic, treatment, and preventive health maintenance plans for each patient, performing routine medical/surgical procedures, and conducting client communication/education. Wide variety of cases.

**CVM 6648. Advanced Clinical Oncology Rotation.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or grad student or #) Case management, self-directed research. Students receive oncology referrals, work with emergency cases and special procedures, assist in treatment decisions and therapeutic options for new cases, and manage ongoing chemotherapy/radiation therapy patients. Emphasizes principles of oncology and patient care.

**CVM 6651. Small Animal Ultrasound (SAUS).** (2 cr [max 8 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM or #) Ultrasound equipment, physics of ultrasound, planar abdominal anatomy, abdominal ultrasonography/abdominal masses/effusions, sonographic assessment of liver, spleen, pancreatic diseases, urinary tract diseases, male/female repro tract. Head and small parts. Introduction to cardiac ultrasound.

**CVM 6661. Neurology (Neur).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM or #) Medical/surgical neurology. Providing complete neurological service for clients, patients, and hospital. Integration into all aspects of service, including receiving, work up, surgery, care, communications, and discharges.

**CVM 6662. Comparative Anesthesiology (Anes).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr) Practical experience in sedating/anesthetizing routine clinical cases. Previously taught lab protocols/techniques are used in healthy normal clinical cases and adapted for high risk cases. Emphasizes problem solving in formulation of anesthetic plans, management of patients under anesthesia, team work, and pain management.

**CVM 6663. Small Animal Surgery (SAS).** (2 cr [max 8 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Diagnostic/therapeutic management of surgical patients. History taking, physical examination, communication, problem solving, and surgical techniques. Economic issues. Students work as part of a surgical service team with faculty member, resident, and intern.

**CVM 6664. Elective Small Animal Surgery (ESAS).** (2 cr [max 10 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Elective surgeries such as ovariohysterectomies, neuters, and declaws for small animals. Two-student teams are responsible for pre-surgical evaluation, anesthesia induction/maintenance, surgical procedure, and post-operative care of animals supplied by Humane Society for Companion Animals.

**CVM 6665. Small Animal Physical Rehabilitation.** (2 cr [max 4 cr]; A-F only) Students work closely with veterinary technician and physical therapist who are certified canine rehabilitation practitioners. Evaluating a patient to determine a rehabilitation problem list. Establishing treatment goals. Application of basic physical modalities, proper passive range of motion, beginning therapeutic exercises. Students develop treatment goals and plan for one orthopedic and one neurologic case.

**CVM 6666. Special Procedures in Veterinary Radiology.** (2 cr; Stdnt Opt. Prereq-DVM 3rd or 4th yr or grad or #) Contrast agents and procedures used to examine various body systems or anatomical areas.

**CVM 6668. Small Animal Radiology (RAD).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Review/practice skills for interpretation of radiographs and positioning of patients. Intravenous urography, cystography, intestinal contrast studies. Emphasizes concepts of radiographic interpretation, in daily rounds. Large/small animal species.

**CVM 6669. Radiology: Mixed Animal.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Skills related to interpretation of radiographs, positioning of patients for small/large animal radiographic procedures. Intravenous urography, cystography, intestinal contrast studies. Students observe small animal ultrasonography cases. Principles/terminology of ultrasound. Computed tomography. Radiographic interpretation in small/large animal species. Issues related to radiation protection.

**CVM 6682. Small Animal Theriogenology (SATH).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Breeding management, artificial insemination, semen collection/evaluation, dystocia management. Testing for canine brucellosis, pyometra, vaginitis, and prostate disease. Interactive review sessions, case studies, client cases. Students present review of a "theriogenology question of the month" from JAVMA and present study on reproduction topic of choice.

**CVM 6685. Small Animal Reproductive Diagnostic Technique Lab.** (1 cr; S-N or Aud. Prereq-DVM or #) Hands-on clinical experience in the evaluation of small animal reproduction. Two three-hour labs, several projects.

**CVM 6690. Integrative Medicine.** (2.5 cr; S-N or Aud. Prereq-2nd yr DVM student or #) History/principles of acupuncture, chiropractic, and other commonly used complementary approaches to care of domestic animals. Training requirements for certification. Lectures, case examples, demonstrations.

**CVM 6691. Veterinary Acupuncture (AcPunct).** (2 cr [max 6 cr]; Stdnt Opt. Prereq-[6690, [yr 3 or 4 DVM]] or #) Basic veterinary acupuncture theory, point combination, treatment, diagnosis of diseases, hands-on veterinary acupuncture technique.

**CVM 6700. Advanced Track Block.** (12 cr; S-N or Aud. Prereq-3rd yr DVM student) Preparation for senior rotations.

**CVM 6702. Large Animal Palpation Labs.** (2 cr; S-N only. Prereq-DVM or #) Hands-on clinical experiences in equine, bovine, or large animal reproductive status/disorders. Students select species.

**CVM 6704. Reproductive Diseases of Cattle.** (2 cr [max 6 cr]; A-F or Aud. Prereq-3rd yr DVM or #) Common diseases affecting reproductive function in cattle, swine, and small ruminants.

**CVM 6709. Advanced Building Design.** (2 cr [max 16 cr]; Stdnt Opt. \$VME 7709. Prereq-DVM 4th yr or CVM grad student or #) Design of animal housing systems. Evaluation of operating production units. Natural/mechanical ventilation systems. Ventilation and building placement. Classroom presentations, on-farm evaluations.

**CVM 6711. Large Animal Medicine (LAM).** (2 cr [max 8 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Medical diseases of horses, cattle, small ruminants, South American camelids, and pot bellied pigs. History taking, clinical diagnosis, patient management. Assessment of treatment responses. Clinic case material, opportunities to practice common procedures. Small group discussions on clinical diagnosis, treatment, and prevention of common medical disorders.

**CVM 6712. Equine Ambulatory Rotation.** (2 cr [max 4 cr]; A-F only) Equine ambulatory rotation meeting for two weeks performing farm calls, call backs, x-ray development, and restocking the van. Student and practitioner discuss cases as calls are being made.

**CVM 6714. Large Animal Surgery (LAS).** (2 cr [max 40 cr]; Stdnt Opt. Prereq-Student enrolled in 3rd or 4th year of DVM program or #) General surgery, lameness cases. Emphasizes horses. Some cattle, small ruminants/camelids. Diagnostic/therapeutic management in hospital setting. Cases, rounds, exercises. Students work as part of surgical team in cases ranging from routine to those requiring intensive management or advanced diagnostic/therapeutic techniques available in a referral setting.

**CVM 6715. Large Animal Surgery and Lameness.** (2 cr [max 10 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM student or #) General surgery, lameness cases. Emphasizes horses. Some cattle, small ruminants/camelids. Diagnostic/therapeutic management in hospital setting. Cases, rounds, exercises. Students work as part of surgical management or advanced diagnostic/therapeutic techniques available in a referral setting.

**CVM 6716. Large Animal Anesthesia (LAAN).** (2 cr; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Anesthesiologists and students work as a team to determine proper anesthetic management and monitoring of events during general anesthesia. Local-anesthetic techniques. Problem solving in formulation of anesthetic plans. Management of patients under anesthesia. Emphasizes team work and pain management.

**CVM 6717. Large Animal Diagnostic Ultrasonography (LAUS).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr) Fundamentals of diagnostic ultrasound in large animal patient. Ultrasonography of equine limbs, joints, abdomen, and thorax. Ultrasound of cases within hospital as available. Dissection of equine limbs required. Students present topic of choice in large animal ultrasound and participate in general emergency duty for large animal hospital.

**CVM 6718. Large Animal Community-based Practice Mentoring.** (1 cr; S-N only. Prereq-2nd yr DVM or #) Large animal veterinary practice, clinical skills. Students pair with a veterinarian and visit veterinary practice for a total of 16 hours during term.

**CVM 6720. Problem Solving in Equine Medicine.** (2 cr; A-F or Aud. Prereq-DVM 3rd yr or #) Evidence-based medicine and clinical epidemiology concepts are integrated into discussion of cases. Assignments include reading of journal articles, working through case scenarios on Web CT, and answering case-based questions.

**CVM 6721. Neonatology.** (1-2 cr [max 2 cr]; S-N or Aud) Instruction, emergency duty, and practical application of principles in evaluating and treating sick equine neonates. Seasonal participation in clinically managing hospitalized foals and periodically reviewing past cases.

**CVM 6722. Clinical Anatomy of the Equine Limb.** (1-2 cr [max 4 cr]; S-N or Aud. Prereq-#; limited registr--1st yr DVM students have priority) Practical limb anatomy. Clinical cases, common surgical procedures. Special diagnostic techniques such as radiology, nerve blocks, joint injections, and ultrasound.

**CVM 6727. Equine Palpation.** (1 cr; S-N only. Prereq-DVM or #) Hands-on clinical experience in evaluation of equine reproductive status and reproductive disorders.

**CVM 6728. Reproductive Diseases of the Horse.** (1 cr; A-F or Aud. Prereq-3rd yr DVM or #) Reproduction patterns, breeding practices, management, artificial insemination, economics of reproductive performance, and infertility in horses.

**CVM 6730. Advanced Equine Practice Elective.** (3.5 cr [max 8 cr]; S-N or Aud. Prereq-3rd or 4th yr DVM or #) Intensive course on equine medicine. Theriogenology content/skills beyond core.

**CVM 6731. Advanced Equine Practice Elective: Surgical Supplement.** (2 cr; S-N only. Prereq-3rd or 4th yr DVM or #) Equine medicine, surgery, theriogenology content/skills beyond core, necessary for entering predominately equine practice. Intensive lab.

**CVM 6732. Equine Dentistry and Preventative Medicine.** (2 cr [max 4 cr]; A-F only. Prereq-3rd or 4th yr DVM or #; intended for equine track or mixed track students) Two-week rotation on dental health care and general preventative health care for horses. Field trips, presentations, labs, case studies, clinical cases.

**CVM 6734. Equine Surgery.** (2 cr [max 8 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Basic surgical principles relating to horses. History taking, diagnostics. Development of therapeutic plan from surgical standpoint.

**CVM 6736. Equine Lameness and Podiatry.** (2 cr [max 4 cr]; A-F only. Prereq-Intended for equine track or mixed track students) Rotation introduces diagnosis/treatment of equine lameness/hoof disorders. Clinical cases, presentations, case studies, labs.

**CVM 6747. Equine Theriogenology Introduction (ETHI).** (2 cr [max 16 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Techniques in equine reproduction. Handling of stallions/mares. Testing for estrus detection. Rectal palpation, ultrasound exam of reproductive tract. Breeding management, hormone treatments, vaginal examination, uterine culture, cytology/biopsy, semen collection/evaluation, intrauterine therapy, artificial insemination.

**CVM 6748. Equine Theriogenology Advanced (ETHA).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Students are in charge of breeding management decisions: select mares from teaching herd, use palpation and ultrasound/pharmacologic aids to ensure timely breeding to frozen semen, which was frozen/assessed by students. Students participate in equine theriogenology cases admitted to Veterinary Medical Center.

**CVM 6750. Equine Sports and Rehabilitation Medicine.** (2 cr [max 4 cr]; A-F only. Prereq-DVM 3rd or 4th yr or #; intended for equine track or mixed track students) Rotation on equine sports medicine, exercise physiology, and rehabilitation therapy. Common injuries, prevention/management protocols. Principles/practices of athletic conditioning, performance testing, and rehabilitation therapy. Field trips, presentations, labs, case studies, clinical cases.

**CVM 6752. Advanced Equine Elective I.** (1 cr; A-F only. Prereq-Veterinary core curriculum for Advanced Equine Elective 1) More depth on equine health topics than offered in core curriculum. Includes cadaver lab and two live horse exercises.

**CVM 6753. Advanced Equine Elective 2.** (1 cr; A-F only. Prereq-Advanced Equine Elective 1) Lecture format. Topics in equine medicine. More depth than core veterinary courses.

**CVM 6754. Advanced Equine Elective 3.** (1 cr; A-F only) Equine sports disciplines, adaptations to training, common causes of poor performance. Assigned project.

**CVM 6789. Fresh Dairy Doe and Newborn Goat Kid Management.** (2 cr [max 4 cr]; A-F only) Rotation at Poplar Hill Goat Dairy during fresh doe/goat kid season. How to recognize, diagnose, and treat kid illnesses. Health strategies to control Johne's, caprine arthritis encephalitis virus, coccidiosis, neonatal diarrheas, mastitis, parasitism, and nutritional deficiencies.

**CVM 6790. Advanced Small Ruminant Practice.** (1.5 cr [max 3 cr]; A-F or Aud. Prereq-DVM 3rd or 4th yr or #) Training beyond core in practice of small ruminants. Common diagnostic/therapeutic procedures.

**CVM 6792. Small Ruminant Health and Production Rotation (SmRu).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Sheep, goat, llama, farmed-deer production, medicine, and health. Nutrition/health management, new stock, facility maintenance, husbandry, diagnosis, record keeping, zoonosis, necropsy. Reproductive management. Breeding soundness, body condition, vasectomy, ultrasound, castration, tail docking, disbudding, dehorning, vaccination, parasites, restraint/handling, venipuncture, foot trimming, tuberculin testing. Farm visits.

**CVM 6793. Small Ruminant Reproduction.** (.5 cr; A-F or Aud. Prereq-3rd yr DVM or #) Breeding soundness of males, embryo transfer, artificial insemination semen, cryopreservation. Reproductive management of goat/sheep herds. Sire/dam selection, genetic potential, nutritional affects. Reproductive tracts. Estrus detection, breeding patterns, reproductive pharmacology. Vaginal examination, biopsy/cytology, reproductive microbiology. Camelid progesterone case studies. Captive breeding programs for wild hoof stock.

**CVM 6794. Camelid Medicine, Surgery, Reproduction, and Health Management.** (2 cr [max 4 cr]; A-F only. Prereq-3rd or 4th yr DVM or #) Two-week rotation. Approximately 15 farm visits are made to alpaca/llama farms. Approximately 10 alpacas/llamas are evaluated at VMC. Hands-on learning environment. Physical exam, venipuncture, ultrasound. Field surgeries such as castration, dental work, foot trimming, venipuncture, body condition score, preventive herd health management, pharmaceuticals. Common medical/reproductive problems. Interstate health certificates. Tuberculosis testing and necropsy.

**CVM 6795. Herd Health.** (2 cr; S-N or Aud. Prereq-1st yr DVM or #) Herd health programs for dairy/beef cattle, sheep, and dairy goats. Components that constitute a herd health program, their costs/timing. Farm tours demonstrate need/method of applying herd health programs in commercial production settings. Five day, Intersession course.

**CVM 6796. Advanced Feedlot Herd Health (Feedlot).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr student or #) Beef cattle feedlot production, medicine, health management. Production systems. Receiving protocols, economics. Livestock selection/evaluation, health management, facility evaluation. Pre-conditioning, pre-immunization, environmental pollution monitoring, transportation/vaccine protocols, nutrition, respiratory diseases, epidemics/disease. Evaluation of small/large feedlot operations. Body condition scoring, castration, dehorning/parasite control. Necropsy, field pathology sampling.

**CVM 6797. Cow-Calf Herd Health and Production (CCHP).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Cow-calf production, medicine, health management. Seasonal health management, purchasing/introducing new stock, facility requirements/design, husbandry, field diagnostics, reproductive management, vaccine protocols, record keeping, zoonosis. Breeding soundness, dystocia management, body condition scoring, ultrasound, castration, dehorning, venipuncture/parasite control. Field trips to cow-calf operations. Marketing system orientations.

**CVM 6800. Bovine Palpation.** (1 cr; S-N only. Prereq-DVM or #) Practice in diagnostic evaluation of bovine reproductive tract.

**CVM 6801. Advanced Dairy Production Medicine.** (1 cr; S-N or Aud. Prereq-3rd yr DVM or #) Designed to give veterinary students more in-depth coverage of topics in dairy production medicine at the management, preventive, and herd level.

**CVM 6802. Advanced Large Ruminant Clinical Elective.** (1 cr; S-N or Aud. Prereq-DVM 3rd or 4th yr or #) Topics in cattle health/production medicine not included in core. More extensive discussion of conditions introduced in core.

**CVM 6803. Advanced Bovine Practice: Laboratory Block.** (1 cr; S-N or Aud. Prereq-[6802, DVM 3rd or 4th yr] or #) Cattle health, production medicine. Topics not included in core, more extensive discussion of conditions introduced in core.

**CVM 6804. Bovine Surgery.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Technical/theoretical skills in management of individual cow surgical diseases. Emphasizes abdominal/urogenital surgery of dairy cow. Discussion, labs. Students research topics and prepare for surgery.

**CVM 6805. Food Animal and Exotic Animal Anesthesia.** (.5 cr; S-N or Aud. Prereq-5321 or equiv) Techniques/complications of sedation, local anesthesia, and general anesthesia in ruminants, pigs, and some large exotic species. Cases demonstrate anesthetic management of clinical problems common in veterinary practice.

**CVM 6806. Food Animal Disease and Diagnostics.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM student or #) Two-week rotation. Food animal necropsies, diagnostic assays.

**CVM 6811. Dairy Theriogenology Palpation (DThP).** (2 cr [max 20 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Palpating the reproductive tract of the cow per rectum. On-farm reproductive record systems. Evaluating dairy herd reproductive performance through DHI reports. Dairy Comp 305 and DairyCHAMP reports. Farm visits, case discussions, laboratories, student presentations.

**CVM 6813. Miracle of Birth.** (2 cr [max 4 cr]; A-F only. Prereq-3rd or 4th yr DVM or #) Two week rotation associated with MVMA's reproduction booth (Birthing Center) at Minnesota State Fair. Students participate in delivery of calves, lambs, and piglets, and assist in public education about processes related to large animal delivery and veterinary care.

The faculty and staff are amazing—they truly want their students to succeed and go out of their way to help us. They stress class-cohesion and cooperation to help everyone succeed. I am incredibly happy with my decision of where to attend veterinary school.

*Carrie Rodman, Class of 2012*

**CVM 6818. General Dairy Herd Health and Disease.** (2 cr [max 8 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM or #) Concepts/practices used by veterinarians serving their clients at herd level. Strategies for controlling commonly encountered dairy diseases. Proper/legal use of therapies. Management of dairy to promote animal health/productivity. Vaccination programs, residue avoidance, animal welfare concerns.

**CVM 6821. Dairy on Farm Campus (DOFC).** (2 cr [max 12 cr]; A-F only. Prereq-3rd or 4th yr DVM student or #) Typical transition cow management, clinical veterinary care. Students assist in all aspects of day-to-day management of TMF. Fresh cow screening/therapies, calvings, routine animal management. Students live at TMF during rotation.

**CVM 6824. Directed Studies in Dairy Production Medicine.** (2 cr [max 4 cr]; S-N only) Student explores dairy production medicine topic in greater detail. Review/report of rotation is submitted to faculty sponsor.

**CVM 6825. Advanced Topics in Dairy Production Medicine.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-6818, 6826, 6827, 6828, 6829, [3rd or 4th yr DVM]) Advanced discussion of topics covered previous dairy production medicine rotations.

**CVM 6826. Dairy Production Medicine 1.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM) First in series of rotations. Mastitis control. Milking equipment function. Reproductive physiology, management implementation. Standardized disease diagnostic approaches, treatment/vaccination protocols. Record analysis. Dietary evaluation/formulation. Feeding management. Housing, cow comfort, animal welfare. Economic concepts. Spreadsheet, computer skills. Youngstock management, genetic improvement. Taught at TMF.

**CVM 6827. Dairy Production Medicine 2.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-6818, 6826, [3rd or 4th yr DVM or #]) Rotation expand on topics listed under Dairy Production Medicine 1.

**CVM 6828. Dairy Production Medicine 3.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-6818, 6826, 6827, [3rd or 4th yr DVM or #]) Rotation provides additional training following Dairy Production Medicine 2.

**CVM 6829. Dairy Production Medicine 4.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-[6818, 6826, 6827, 6828, [3rd or 4th yr DVM] or #) Rotation completes four rotation series in 6826, 6827, and 6828.

**CVM 6835. Special Topics in Food Animal Medicine.** (.5-2 cr [max 4 cr]; A-F only. Prereq-Submission of proposal, faculty member approval)

**CVM 6840. Swine Core.** (2 cr; Stdnt Opt. Prereq-DVM or #) Swine medicine, production, and health management.

**CVM 6841. Swine Behavior.** (.5 cr [max 2 cr]; Stdnt Opt. Prereq-[3rd or 4th yr] DVM or #) Common considerations in swine behavior.

**CVM 6842. Swine Disease Diagnostics, Therapeutics, and Prevention (SDxT).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Major diseases and high-health technologies. Field trips of high-/low-health farms, abattoir for slaughter check. Problem solving, discussion of on-farm disease cases. In-clinic diagnostic techniques.

**CVM 6843. Understanding PRRS: A Problem-Based Approach.** (3 cr; A-F or Aud. Prereq-3rd or 4th year DVM or graduate student or practitioner) Students experience real-time cases of Porcine Reproduction and Respiratory Syndrome (PRRS) and devise diagnostic plans/intervention strategies, receiving actual diagnostic/production data to monitor progress. Course is all on-line.

**CVM 6844. Swine Production Systems (SPdn).** (2 cr [max 4 cr]; Stdnt Opt. \$VMED 7844. Prereq-DVM 3rd or 4th yr or #) Alternative systems of swine production. Didactic lectures, labs, special projects. Information management systems, building and equipment designs, health, genetics nutritional systems, marketing alternatives. Influence of production systems on biological and financial endpoints. Upon completion, present project completed on design of various components of integrated swine production system.

**CVM 6845. Swine Production Training (SPTr).** (2 cr [max 8 cr]; Stdnt Opt. Prereq-3rd or 4th yr DVM or #) Day-to-day management of modern swine farm. Students assist with all techniques, protocols, and practices encountered daily in swine unit, conduct any necessary necropsies or surgical techniques, investigate production/health problems. On final day of rotation, students lead herd visit, summarize findings with producer and course coordinator, and write a herd report.

**CVM 6846. Swine Nutrition.** (2 cr [max 8 cr]; S-N or Aud. \$VMED 7846. Prereq-DVM 3rd or 4th yr or #) Nutrition and feeding management of pigs. Nutrient requirements. Feeds, feed delivery, and feeding management. Computer laboratories. Farm visits.

I was looking for an exceptional education in veterinary medicine. What I found at the University of Minnesota College of Veterinary Medicine was not only this but a dynamic community where the professors are dedicated and enthusiastic, the students are warm and supportive, and the learning environment promotes a collaborative and interactive approach.

By being involved in state-of-the-art research and disease control studies like Tuberculosis surveillance in northern Minnesota, my classmates and I are able to reap the benefits of working alongside some of the most extraordinary individuals who have already made a significant impact in this field.

Jenn

**CVM 6848. Finance for the Small Business and You (FPSB).** (1 cr [max 2 cr]; A-F only. Prereq-DVM 3rd or 4th yr or #) Basic accounting and financial skills to understand small-business problems and communicate findings. Financial statements, budgeting, partial/capital budgets, time value of money, assessing return on investment. Examples from veterinary practice and food production companies. How to become personally financially independent. Managing personal finances, investments, future needs, debt repayment.

**CVM 6850. Swine Records (SRec).** (2 cr [max 8 cr]; Stdnt Opt. §VMED 7850. Prereq-DVM 3rd or 4th yr or #) How to interpret performance measures, monitor productivity, capture data, and generate reports in managing production in swine industry. Using records to troubleshoot problems and manage production.

**CVM 6852. Swine Virology.** (2 cr [max 8 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Lab techniques for diagnostic virology, serology, and immunology. Research techniques for use of fluorescent antibodies, determination of classes of immunoglobulins, and immunostimulation of lymphocytes.

**CVM 6854. Introduction to Swine Health and Production.** (2 cr [max 12 cr]; Stdnt Opt) Clinical problem solving based on case examples, first-hand field experiences. Students visit/assess enterprises representing all components of pork chain, from feed milling, to animal production, to slaughter/processing. Roles/responsibilities veterinarians have in food animal production. Problem definition/investigation. Formal follow up, report writing, oral presentation of recommendations.

**CVM 6855. Principles of Population Based Diagnostics and Therapeutics.** (2 cr [max 12 cr]; Stdnt Opt) Principles of population (herd) based diagnostic/therapeutic decision making. Theoretical/practical aspects of diagnostic test performance/interpretation. Case-based examples of major swine diseases in North America. Therapeutic decision making in swine populations, including pharmacologic, legal, economic, and logistic considerations. Diagnostic/therapeutic procedures.

**CVM 6856. Advanced Swine Health and Production.** (2 cr [max 12 cr]; Stdnt Opt) Capstone course. Complex field problems. Student teams take a field case, work it up, and propose steps for farm to resolve problem. Lectures, in-class exercises, field trips.

**CVM 6860. Integrating Laboratory Diagnostics With Field Investigations of Swine Disease.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Students follow selected swine disease investigations, from farm through diagnostic lab and back, determine impact of specific swine diseases on productivity and cost of production, design a control program, and collect/submit quality samples to diagnostic lab.

**CVM 6865. Introduction to Swine Production Medicine.** (1 cr [max 2 cr]; A-F only. Prereq-DVM student or #) Contemporary approaches to swine practice. Swine production, disease diagnosis. Control, treatment, eradication.

**CVM 6880. Avian Core.** (2-4 cr [max 4 cr]; A-F only. Prereq-DVM or #) Avian nutrition, physiology, anatomy, and disease.

**CVM 6882. Companion Birds (ComB).** (2 cr [max 4 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Avian medicine/surgery relating to companion birds. Hands-on experience in local aviaries and breeding facilities. Acquisition of basic avian clinical skills in the Raptor Center.

**CVM 6883. Raptor Center.** (2 cr [max 4 cr]; Stdnt Opt. Prereq-6497, DVM 3rd or 4th yr, #) Students participate in all aspects of raptor medicine, surgery, and rehabilitation and gain avian experience. Conservation medicine.

**CVM 6930. Medical Management of Zoo Animals.** (1 cr; S-N or Aud. Prereq-3rd yr DVM or #) Zoo animal handling techniques, including physical/chemical restraint, commonly seen diseases, preventative medicine programs. Adaptation to standard medical practice/management techniques for zoos. Lectures.

**CVM 6931. Diseases of Zoo Animals and Exotic Pets.** (1 cr; S-N or Aud. Prereq-DVM or grad or #) Diseases of and management procedures for zoo animals and exotic pets. Restraint procedures, medication, diagnosis.

**CVM 6932. Advanced Zoo Animal Medicine.** (1 cr; S-N or Aud. Prereq-[6931, [DVM 3rd or 4th yr] or #) Adapting existing veterinary techniques/principles to zoo animal medicine. Animal management and preventive medicine programs.

**CVM 6933. Zoological Medicine (MNZM).** (2 cr [max 20 cr]; Stdnt Opt. Prereq-DVM 3rd or 4th yr or #) Introduction to all aspects of health care of zoo animals. Housing, nutrition, preventative health programs. Students assist zoo veterinarians with immobilizations, examinations, necropsies, laboratory work, records keeping.

**CVM 6934. Selected Topics in Zoo Animal Medicine.** (5 cr [max 10 cr]; A-F or Aud. Prereq-DVM 1st or 2nd yr or #) Year-long course. Overview of expertise needed by a zoo veterinarian, applications to specific captive species. Students participate in managing an animal problem or animal group problem, develop diagnostic/management/therapeutic recommendations, research three topics on an assigned species, build reference materials for case care, present findings to keepers at a selected zoo, and develop an item for public education.

**CVM 6980. Biology, Ecology, and Conservation of Large Mammals.** (2 cr; A-F only. Prereq-DVM) Conceptual/practical framework for large-mammal biology/ecology. How conservation of these species has been and is being addressed.

## Veterinary Medicine, Graduate (VMED)

**VMED 5080. Problems in Veterinary Epidemiology and Public Health.** (1-3 cr [max 3 cr]; A-F or Aud) Individual study on problem of interest to epidemiology or public health student.

**VMED 5082. Diagnostic Epidemiology of Infectious Diseases.** (2 cr; A-F only. Prereq-Statistics course or #) Theoretical principles, practical applications of diagnostic testing in populations. Examples related to infectious diseases in veterinary/human health. Basis of test performance, limitations, interpretations.

**VMED 5090. Seminar: Veterinary Epidemiology.** (1 cr [max 3 cr]; S-N or Aud. Prereq-Veterinary Medicine grad student) Each student leads at least one seminar. Reviews of current research, literature reviews, and technique development. Students and participating faculty participate in presentation, discussion, and administration of the seminars.

**VMED 5093. Directed Studies in Population Medicine.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMED 5165. Surveillance of Foodborne Diseases and Food Safety Hazards.** (2 cr; Stdnt Opt. SPUBH 6181. Prereq-[PUBH 5330, [professional school or grad student]] or #) Principles/methods for surveillance of foodborne diseases. Investigation of outbreaks. Assessment of food safety hazards. Focuses on integration of epidemiologic/lab methods.

**VMED 5190. Seminar and Presentation Development.** (2 cr; S-N only. Prereq-Grad student) Skills needed to research, organize, develop, and deliver an oral scientific presentation or to assist in finding, compiling, and organizing information for presentations, theses, or papers suitable for publication.

**VMED 5193. Dairy Decision Making in a Financial Context.** (2 cr; A-F or Aud. Prereq-Earned DVM, #) Economic/decision making principles applied to commercial dairy farms in North America. Economic techniques, decision making under financially constrained conditions. Financial evaluation of a dairy operation. Modules assignments, written work submitted via the Internet, discussions at online course site.

**VMED 5210. Advanced Large Animal Physiology I.** (1-3 cr [max 6 cr]; Stdnt Opt) Review of large animal physiology at level needed for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

**VMED 5211. Advanced Large Animal Physiology II.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-#: 5210 recommended) Large animal physiology for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

**VMED 5212. Large Animal Diagnostic Ultrasonography.** (1 cr; A-F or Aud. Prereq-#) Fundamentals of diagnostic ultrasound in large animal patient. Ultrasonography of the equine limbs/joints, large animal abdomen/thorax. Lectures, lab.

**VMED 5232. Comparative Clinical Veterinary Dermatologic Pathology.** (1 cr [max 2 cr]; S-N only. Prereq-DVM degree or foreign equiv) Microscopic pathology of basic dermatologic reactions and of variable disease states.

**VMED 5240. Advanced Small Animal Pathobiology I.** (1 cr; A-F only. Prereq-CVM grad student, [DVM or foreign equiv] degree) Biology, physiology, pathophysiology, and medicine of disciplines relevant to companion animals. Pathogenesis/treatment of diseases. Developing hypotheses that can be translated into clinical research.

**VMED 5241. Advanced Small Animal Pathobiology II.** (1 cr; A-F only. Prereq-CVM grad student, [DVM or foreign equiv] degree) Overview of biology, physiology, pathophysiology, and medicine of disciplines. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

**VMED 5242. Advanced Small Animal Pathobiology III.** (1 cr; A-F only. Prereq-CVM grad student, [DVM or foreign equivalent] degree) Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

**VMED 5243. Advanced Small Animal Pathobiology IV.** (1 cr; A-F only. Prereq-CVM grad student, [DVM or foreign equiv] degree) Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

**VMED 5274. Diseases of the Urinary System.** (1 cr; A-F or Aud. Prereq-#) Expands on disorders of small animal urinary system. Introduction to core and to additional disorders.

**VMED 5291. Independent Study in Veterinary Medicine.** (2 cr; Stdnt Opt. Prereq-DVM, #) Arranged independent study in a clinical area of veterinary medicine.

**VMED 5293. Directed Studies in Comparative Medicine and Pathology.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMED 5295. Problems in Large Animal Clinical Medicine/Surgery and Theriogenology.** (1 cr [max 3 cr]; A-F or Aud. Prereq-VMed grad student, possess DVM) Hospital cases using standardized format, audiovisual aids. Review literature pertaining to case. One or two cases presented by enrolled participants per month.

**VMED 5310. Topics in Veterinary Clinical Pathology.** (1 cr [max 2 cr]; S-N only. Prereq-Grad student in CVM) Modified rounds format. Cases from VMC used to explore cytology with associated chemistry/hematology data. Attendees/clinicians can request lab topics for discussion. Past topics have included lab measurement of chemical analytes, test sensitivity or specificity (e.g., ethylene glycol test, FELV test), lab testing for infectious agents.

**VMED 5319. Veterinary Gross Pathology.** (1 cr [max 3 cr]; S-N only. Prereq-Grad student in CMB or [VMED, [DVM degree or foreign equivalent], □]) Diagnosing gross lesions of tissues. Evaluating images from wide variety of animals submitted to lab. Mock exams. Students prepare two in-depth reviews on topics covered during in course.

**VMED 5320. Advanced Veterinary Systemic Pathology I.** (3 cr; A-F only. Prereq-Grad student in VMED or [CMB, [DVM degree or foreign equiv]] or #) Students review/summarize topics in systemic pathology using veterinary pathology textbooks and relevant updates from pathology and veterinary medical journals. Diagnostic cases in alimentary, respiratory, urinary, cardiovascular, and hematopoietic system pathology. Students give 10-15 presentations with handouts for other students.

**VMED 5321. Advanced Veterinary Systemic Pathology II.** (3 cr; A-F only. Prereq-Grad student in VMED or [CMB, [DVM degree or foreign equiv]] or #) Students review/summarize topics in systemic pathology using veterinary pathology textbooks and relevant updates from pathology and veterinary medical journals. Representative diagnostic cases in endocrine, reproductive, musculoskeletal, nervous, special senses, and integumentary system pathology. Student give 10-15 presentations with handouts for other students.

**VMED 5330. Veterinary Descriptive Histopathology.** (1 cr [max 2 cr]; Stdnt Opt. Prereq-Grad student in VMED or [CMB, [DVM degree or foreign equiv]] or #) Weekly, one-hour microscopic slide presentations, reviews on wide variety of diseases in domestic/non-domestic animals. Students present microscopic slide cases and prepare discussions about disease entities, differential diagnoses, and ancillary tests.

**VMED 5380. Veterinary Diagnostic and Comparative Pathology.** (2 cr [max 4 cr]; A-F only. Prereq-[DVM/VMD or equiv degree] from a foreign institution, [resident or grad student] in [veterinary anatomic or clinical pathology], #) Diagnostic skills in gross/microscopic pathology. Students participate in necropsy services of veterinary diagnostic lab, examine carcasses from variety of animals. Case write-ups, interpretation of gross/microscopic lesions done under supervision of faculty pathologists. Students assist in supervision of veterinary students on senior necropsy rotation.

**VMED 5395. Problems in Veterinary and Comparative Pathology.** (3 cr; A-F only. Prereq-Grad student in CVM, [DVM degree or foreign equiv]) Case material in Veterinary Diagnostic Lab. Students investigate pathogenesis/epidemiology of selected disease condition or case-related problem agreed upon with faculty pathologist.

**VMED 5410. Scientific Writing and Speaking.** (2 cr; A-F only. Prereq-Grad student in health sciences) Techniques of writing/publishing papers/theses. Manuscript preparation. Submission/review process. Proofreading. Publishing processes. Grant Writing. Oral/poster presentations at scientific meetings.

**VMED 5420. Molecular Epidemiology of Infectious Disease.** (3 cr; A-F only. Prereq-Basic course in microbiology) Impact, application, and interpretation of molecular techniques in understanding etiology, transmission, and control of infectious diseases important to animal and public health. Theoretical/practical aspects of molecular biology methods in context of epidemiological studies of infectious diseases, including bacterial/viral infections of veterinary/zoonotic significance. Population and evolutionary genetics of pathogenic microorganisms. Data analysis/interpretation. Design of descriptive/hypothesis-driven epidemiological studies involving molecular techniques.

**VMED 5493. Directed Studies in Infectious Disease.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMED 5496. Training in Swine Production and Management.** (4 cr; S-N only. Prereq-VMED grad student or #) Production module introduces techniques/protocols for swine production system operation. Research module covers applied research trials for viral/bacterial pathogens in pigs.

**VMED 5596. Swine Diseases and Diagnostics.** (2-3 cr; Stdnt Opt) Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.

**VMED 5610. Companion Animal Oncology.** (2 cr; S-N or Aud. Prereq-DVM, #) Principles of veterinary oncology. Biologic behaviors, treatments, and prognosis of neoplastic disorders.

**VMED 5621. Principles of Veterinary Anesthesiology.** (2 cr; A-F only. Prereq-VMED grad student, [DVM degree or foreign equiv], instr consent) In-depth training in principles of veterinary anesthesiology. Lectures, anesthesia labs, presentations by students.

**VMED 5670. Bovine Surgery Practicum.** (2 cr; S-N only. Prereq-[VMed grad student, [DVM or equiv foreign degree]] or #) Intensive training in ruminant surgery. Evaluation of food animal surgery principles, hands-on laboratory components.

**VMED 5691. Independent Research in Veterinary Anesthesiology.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-[Biology major or prevet or vet or grad student], #) Independent research supervised by faculty member.

**VMED 5693. Directed Studies in Surgery/Radiology/Anesthesiology.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMED 5893. Directed Studies in Theriogenology.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMED 5910. Grant Writing: What Makes a Winning Proposal?.** (1 cr; S-N or Aud. §CMB 5910) Components of a strong proposal. Grant submission process. What reviewers look for. How to locate grant announcements that match research interests.

**VMED 8090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans.** (3 cr; A-F or Aud. Prereq-Epidemiology and infectious disease course or #) Major human zoonotic diseases, methods of transmission, diagnosis, control, and prevention.

**VMED 8134. Ethical Conduct of Animal Research.** (3 cr; A-F or Aud. §ANSC 8134, CMB 8134. Prereq-[Grad or professional school] student or #) Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

**VMED 8195. Pre-Harvest Food Safety and Public Health Aspects of Food Animal Production.** (1-3 cr [max 3 cr]; Stdnt Opt) Includes presentations and discussions on on-farm HACCP principles and prudent use of antibiotics.

**VMED 8201. Advanced Small Animal Veterinary Medicine.** (1-5 cr [max 5 cr]; A-F or Aud. Prereq-#) Discussions of diseases of organs or systems in animals, including degenerative, psychological, anomalous, metabolic, nutritional, neoplastic, immune, inflammatory, toxic, and traumatic disorders.

**VMED 8202. Internal Medicine in Small Companion Animals.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-#) Lectures, assigned readings, and discussions on internal medical problems of dogs and cats.

**VMED 8203. Advanced Diagnosis and Therapeutics of Animal Disease.** (1-2 cr [max 2 cr]; A-F or Aud. Prereq-#) Detailed examination, treatment, and discussion of naturally occurring disease in patients admitted to Veterinary Medical Center.

**VMED 8210. Seminar: Veterinary Medicine.** (1 cr; Stdnt Opt. Prereq-#) Participation and presentations of regularly scheduled seminars about internal medicine.

**VMED 8220. Advanced Nephrology/Urology Clinics.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Clinical investigation of naturally occurring urinary diseases in patients admitted to Veterinary Medical Center.

**VMED 8230. Medical Conference.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Participation in weekly conference about internal medical disorders.

**VMED 8250. Problems in Acid-base, Electrolyte, and Fluid Metabolism.** (2-4 cr [max 4 cr]; A-F or Aud. Prereq-#) Clinical problems and physiology of acid-base, electrolyte, and fluid disorders of dogs and cats.

**VMED 8292. Journal Club: Large Animal Internal Medicine.** (1 cr [max 3 cr]; A-F or Aud. Prereq-#) Students/faculty keep abreast of current literature in large animal internal medicine. Students critically evaluate the literature.

**VMED 8293. Advanced Studies in Nephrology and Urology.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-#) Studies of urinary tract disease with goal of generating new knowledge.

**VMED 8294. Research Studies in Nephrology and Urology.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Individual research on selected problems

**VMED 8296. Advanced Large Animal Veterinary Medicine.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-DVM student, vet med grad student, #) Discussions of diseases of organs or systems in animals in a clinical setting.

**VMED 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**VMED 8360. Evidence-based Medicine.** (2 cr; A-F or Aud. Prereq-#) Use of medicine literature in clinical problem solving.

**VMED 8393. Medical Conference.** (1-3 cr [max 6 cr]; A-F or Aud) Medical, surgical, or obstetrical cases supported by anatomic, bacteriologic, pathologic, physiologic, pharmacologic, and radiologic evaluations whenever applicable.

**VMED 8394. Research in Veterinary Medicine.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Research problems relating to any aspect of internal medicine or to the various systems in animals.

**VMED 8396. Diagnostic and Therapeutic Techniques of Animal Diseases.** (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-DVM student, vet med student, #) Detailed examination, discussions, and treatments of cases of animal diseases in a clinical setting.

**VMED 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**VMED 8492. Seminar: Infectious Diseases and Swine Medicine.** (1 cr [max 2 cr]; Stdnt Opt) Students, faculty, and guest speakers present seminars on current research in diagnosis, control, and treatment of infectious diseases.

**VMED 8494. Research in Infectious Diseases.** (1-3 cr [max 3 cr]; Stdnt Opt) Directed research.

**VMED 8495. Problems in Infectious Diseases.** (1-3 cr [max 3 cr]; Stdnt Opt) In-depth discussion on specific problems for various infectious diseases of farm animals.

**VMED 8520. Advanced Immunology.** (2 cr; Stdnt Opt) Lectures and case presentations.

**VMED 8530. Advanced Swine Diseases.** (2 cr; Stdnt Opt) Lectures and discussion on advances.

**VMED 8592. Infectious Disease Journals: Critical Thinking.** (1 cr; Stdnt Opt) Reading and critical discussion of journal articles.

**VMED 8593. Advanced Veterinary Virology and Serology.** (1-3 cr [max 3 cr]; Stdnt Opt) Discussion and laboratory practice.

**VMED 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**VMED 8681. Advanced Small Animal Surgery.** (1-3 cr [max 3 cr]; Stdnt Opt) Advanced techniques and procedures.

**VMED 8682. Advanced Large Animal Surgery.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #) Surgery of various systems in large animals, with preoperative and postoperative evaluation and management.

**VMED 8683. Surgery of the Gastrointestinal System.** (2-4 cr [max 4 cr]; A-F or Aud) Advanced techniques and problems.

**VMED 8684. Surgical Physiology.** (1-3 cr [max 3 cr]; Stdnt Opt) Discussions on pathophysiology of surgical diseases in dogs and cats.

**VMED 8685. Neurosurgery.** (2-3 cr [max 3 cr]; A-F or Aud) Advanced neurosurgical diseases of small animals amenable to surgical treatment.

**VMED 8686. Thoracic and Cardiovascular Surgery.** (2-4 cr [max 4 cr]; A-F or Aud) Advanced thoracic and cardiovascular diseases of small animals amenable to surgical treatment.

**VMED 8688. New Techniques in Large Animal Surgery.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #)

**VMED 8691. Research in Large Animal Surgery.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #) Independent research projects.

**VMED 8692. Seminar: Small Animal Surgery.** (1 cr; A-F or Aud) Discussions of problems and case analysis.

**VMED 8693. Seminar: Large Animal Surgery.** (1 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #) Discussion of current literature and surgery board preparation.

**VMED 8694. Research in Small Animal Surgery.** (1-3 cr [max 3 cr]; S-N or Aud)

**VMED 8695. Problems in Large Animal Surgery.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #) New techniques and procedures in large animal orthopedic surgery.

The University of Minnesota College of Veterinary Medicine has been more than I ever expected. The faculty treat students as colleagues, the atmosphere is strong and supportive, and the curriculum is forward thinking and constantly adjusting to students needs.

*Anna Michael, DVM and MPH Class of 2011*

**VMED 8696. Research in Critical Care/Emergency Medicine.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-DVM or equiv degree) Special problems course. Controlled study; prospective and retrospective models of evaluation are defined, critiqued, and used for experimental design and data collection to validate research methods.

**VMED 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**VMED 8780. Advanced Avian Critical Care: Principles and Procedures.** (2 cr; A-F or Aud. Prereq-Course each in vet pathology, physiology, pharmacology, anatomy, small animal anesthesiology and critical care) Procedures and protocols for managing avian medical emergencies such as starvation, toxicities, respiratory failure, and massive trauma.

**VMED 8781. Seminar: Advanced Veterinary Anesthesiology.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-[CVM 6321, CVM 6322] or equiv), grad student) Active interaction around topics of advanced anesthesiology in veterinary species.

**VMED 8788. Seminar: Veterinary Critical Care/Emergency Medicine.** (1 cr; A-F or Aud. Prereq-DVM or equiv degree) Current topics.

**VMED 8789. Research in Avian Clinical Problems and Procedures.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-DVM, #) Students conduct medical and surgical procedures involved in management of avian trauma and critical care patients.

**VMED 8791. Research in Veterinary Anesthesia.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-8781 or equiv, SACS 5380 or equiv) Research methodology; controlled prospective and retrospective research studies. Collection and analysis of scientific data.

**VMED 8792. Seminar: Veterinary Radiology.** (1 cr [max 6 cr]; Stdnt Opt) Current topics in veterinary imaging, veterinary radiation therapy, or specific applications.

**VMED 8793. Seminar: Veterinary Anesthesiology.** (1-2 cr [max 2 cr]; A-F or Aud. Prereq-[CVM 6321 or equiv], DVM degree) Discussion and presentations; for veterinary anesthesiology and surgery residents and graduate students.

**VMED 8794. Research in Veterinary Radiology.** (1-3 cr [max 3 cr]; Stdnt Opt) Research into an application, development of an application, or prospective/retrospective study of any aspect of veterinary imaging or veterinary radiotherapy.

**VMED 8795. Problems: Veterinary Radiology.** (1-3 cr [max 6 cr]; Stdnt Opt) Discussion of problems associated with veterinary imaging or radiation therapy.

**VMED 8796. Avian Anesthesia and Orthopedic Surgery.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-courses in vet anesthesia, vet small animal orthopedics) Current methods for anesthetizing raptors, psittacine birds, and waterfowl. Lecture and lab on current methods for avian fracture bone fixation.

**VMED 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Veterinary Population Medicine (VPM)

**VPM 3502. Animal Health & Disease.** (3 cr; A-F or Aud. Prereq-Biol 1009) Common diseases that affect farm animals (especially dairy cattle, swine). Host-agent-environment interactions that cause disease (microbiology, immunology, environmental factors). Incorporating preventive management practices in animal production systems, monitoring health/productivity, recognizing disease. Treatment considerations. Major exotic/zoonotic diseases. In-house labs or field trips.

**VPM 3700. Equine Reproduction and Breeding Management.** (2 cr; A-F only. Prereq-AnSc 3305 recommended) Equine stud farm management/procedures. Reproductive physiology of mares/stallions. Manipulation of estrus, breeding stallion management. Breeding systems. Semen collection, evaluation, and extension for on-farm use and cooled shipping. Speculum exam and artificial insemination of mares. Management of pregnant mares, foaling management, exam/diseases of foals. Stud farm design, preventive medicine programs, raising youngstock. Lectures, labs, field trips.

**VPM 4131. Immunology.** (3 cr; Stdnt Opt) Molecular, genetic, and cellular bases for humoral/cell-mediated immunity. Innate immunity. Antigen recognition by B and T lymphocytes. Interactions between lymphocytes and other cells of immune system. Cytokines. Immunoregulation. Key aspects of clinical immunology.

I have my own experience and heard from numerous other students who love the professors—we find them down to earth, approachable, funny, smart and committed to us learning applicable material. We are thoroughly enjoying the faculty, staff and administration. Many of us turned down other schools to be here and are glad we did!

Valarie, Class of 2012

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 Dean Johnson, At Large  
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 David R. Metzen, Congressional District 4  
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 Laura K. Molgaard, D.V.M., Associate Dean for Academic and Student Affairs  
 Larry D. Bjorklund, M.S., Director of Student Affairs and Admissions  
 Peg Dimatteo, M.A., Director of Academic Affairs

### College of Veterinary Medicine Faculty

For contact information on our faculty, please go to [www.cvm.umn.edu](http://www.cvm.umn.edu)

### Department of Veterinary and Biomedical Sciences

#### Professors

Alvin Beitz, Ph.D. Interim Chair  
 Russell Bey, Ph.D.  
 David Brown, M.S., Ph.D.  
 Thomas Fletcher, D.V.M., Ph.D.  
 David Halvorson, D.V.M.

Richard Isaacson, M.S., Ph.D.  
 Mathur Kannan, M.Sc., Ph.D.  
 Alice Larson, Ph.D.  
 Samuel Maheswaran, M.S., Ph.D.  
 James Mickelson, M.S., Ph.D.  
 Michael Murtaugh, Ph.D.  
 Kakambi Nagaraja, D.V.M., M.S., Ph.D.  
 Sriram Rao, M.S., Ph.D.  
 Jagdev Sharma, M.S., Ph.D.  
 Bert Stromberg, M.A., Ph.D.

#### Associate Professors

John Collister, D.V.M., Ph.D.  
 Victor Cox, Jr., D.V.M., Ph.D.  
 Kent Reed, Ph.D.  
 Mark Rutherford, M.S., Ph.D.  
 Randall Singer, D.V.M., Ph.D.  
 Bruce Walcheck, Ph.D.  
 Yinduo Ji, M.S., Ph.D.

#### Assistant Professors

Christina Clarkson, D.V.M., Ph.D.  
 Connie Gebhart, M.S., Ph.D.  
 Lyudmila Hart Vulchanova, B.A.  
 Pamela Skinner, Ph.D.

#### Instructors

Frank Williams, M.S., Ph.D.

### Department of Veterinary Clinical Sciences

#### Professors

Robert Washabau, V.M.D., Ph.D., Chair  
 P. Jane Armstrong, D.V.M., M.B.A.  
 Michael G. Conzemius, D.V.M., Ph.D.  
 Daniel Feeney, D.V.M., M.S.  
 Robert Hardy, D.V.M., M.S.  
 Jody Lulich, D.V.M., Ph.D.  
 Jaime Modiano V.M.D., Ph.D.  
 Carl A. Osborne, D.V.M., Ph.D.  
 David Polizin, D.V.M., Ph.D.  
 Patrick Redig, D.V.M., Ph.D.  
 Larry Wallace, D.V.M., M.S.

#### Associate Professors

Ronald Mandsager, D.V.M.  
 G. Elizabeth Pluhar, D.V.M., M.S., Ph.D.  
 Margaret Root Kustritz, D.V.M., Ph.D.  
 Leslie C. Sharkey, D.V.M., Ph.D.

Anthony Tobias, B.V.Sc., Ph.D.  
Sheila Torres, D.V.M., M.S., Ph.D.

*Assistant Professors*

Keum Hwa Choi, D.V.M., M.S.,  
Ph.D.  
Edward Patterson, D.V.M., Ph.D.  
Catherine St. Hill, D.V.M., Ph.D.

*Instructors*

Paul E. Anderson, D.V.M.  
Maria B. Kilos, D.V.M., M.S.  
Jaqueline W. Piepkorn, D.V.M.  
Christopher D. Stauthammer,  
D.V.M.

*Clinical Professors*

Betty Kramek-Heffernan, D.V.M.,  
M.S.

*Associate Clinical Professors*

Gregory M. Anderson, D.V.M.  
Kari L. Anderson, D.V.M.  
Gary Goldstien, D.V.M.  
Lynelle Graham, D.V.M.  
Lynne Kushner, D.V.M.  
Roberto Novo, D.V.M., M.S.  
Lisa Powell, D.V.M.  
Jane Quandt, D.V.M., M.S.  
Michelle G. Ritt, D.V.M.

*Assistant Clinical Professors*

Julie Churchill, D.V.M., Ph.D.  
Margaret Duxbury, D.V.M.  
Kelly Hall-Wilke, D.V.M.  
Michael Henson, D.V.M., Ph.D.  
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Gia Klauss, D.V.M.  
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Alistair McVey, D.V.M.  
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Jed A. Overmann, D.V.M.  
Travis Saveraid, D.V.M.  
Laura A. Snyder, D.V.M.  
Kelly M. Tart Johnson, D.V.M.  
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Nicole Scotty Trumble, D.V.M.  
Vicki L. Wilke, D.V.M.  
Laura Ziegler, D.V.M.

**Department of Population  
Medicine**

*Professors*

Thomas Molitor, M.S., Ph.D.,  
Interim Chair

*Professors*

Cathy Carlson, D.V.M., Ph.D.  
James Collins, D.V.M., Ph.D.  
Peter Davies, B.V.Sc., Ph.D.  
Scott Dee, D.V.M., Ph.D.  
Melvyn Fahning, D.V.M., M.S.,  
Ph.D.

John Fetrow, V.M.D., M.B.A.

Sagar Goyal, B.V.Sc., Ph.D.  
William Hueston, D.V.M., M.S.,  
Ph.D.

HanSoo Joo, D.V.M., M.S., Ph.D.  
Thomas Molitor, M.S., Ph.D.  
Robert Morrison, D.V.M., Ph.D.  
Michael Murphy, D.V.M., Ph.D.  
Timothy O'Brien, D.V.M., Ph.D.  
Stephanie, Valberg, D.V.M., Ph.D.

*Associate Professors*

John Deen, D.V.M., Ph.D.  
Sandra Godden, D.V.M., D.V.Sc.  
Leslie Sharkey, D.V.M., Ph.D.  
Ashok Singh, Ph.D.  
Srinand Sreevatsan, M.P.H., M.S.,  
Ph.D.  
Ava Trent, D.V.M., M.V.Sc.  
James Waddell, Ph.D.  
Scott Wells, D.V.M., Ph.D.  
Julia Wilson, D.V.M.

*Assistant Professors*

Jeffrey Bender, D.V.M., M.S.  
Patrick Caplazi, D.V.M., Ph.D.  
Ilze Matise, V.D., Ph.D.  
Troy Trumble, D.V.M., Ph.D.  
Arno Wunschmann, D.V.M.

*Clinical Professors and Instructors*

Anibal Armien, D.V.M., M.S., Ph.D.  
Moustafa Boulijihad, D.V.M. Ph.D.  
Jerome Carrier, D.V.M., M.V.Sc.  
Rebecca Davies, Ph.D.  
Nicolas Ernst, D.V.M., M.S.  
Marie Gramer, D.V.M., Ph.D.  
Alfonso Lago, D.V.M.  
Susan McClanahan, D.V.M.  
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Erin Malone, D.V.M., Ph.D.  
Simone Oliveria, Ph.D.

Robert Porter, D.V.M., Ph.D.  
Paul Rapnicki, D.V.M.  
Kurt Rossow, D.V.M., Ph.D.  
Jeremy Schefers, D.V.M.  
Jerry Torrison, M.S., Ph.D.  
Christie Ward, D.V.M., Ph.D.  
Cynthia Wolf, D.V.M.  
Andre Ziegler, D.V.M., M.P.V.M.,  
M.B.A.

**Department of Animal Science  
(affiliate department of CVM)**

*Professors*

James G. Linn, Head  
Brian A. Crooker, Ph.D.  
William R. Dayton, Ph.D.  
Mohamed E. El Halawani, Ph.D.  
Douglas N. Foster, Ph.D.  
Leslie B. Hansen, Ph.D.  
Marcia R. Hathaway, Ph.D.  
Dennis D. Johnson, Ph.D.  
Lee J. Johnston, Ph.D.  
James G. Linn, Ph.D.  
Sally N. Noll, Ph.D.  
Scott M. O'Grady, Ph.D.  
F. Abel Ponce de Leon, Ph.D.  
Jeffrey K. Reneau, D.V.M.  
Anthony J. Seykora, Ph.D.  
Gerald C. Shurson, Ph.D.  
Marshall D. Stern, Ph.D.  
Jonathan E. Wheaton, Ph.D.  
Michael E. White, Ph.D.

*Associate Professors*

Samuel K. Baidoo, Ph.D.  
Hugh Chester-Jones, Ph.D.  
Yang Da, Ph.D.  
Alfredo DiCostanzo, Ph.D.  
Scott Fahrenkrug, Ph.D.  
G. Clifford Lamb, Ph.D.

*Assistant Professors*

Marcia I. Endres, Ph.D.  
Jacqueline Jacob, Ph.D.  
Laura J. Mauro, Ph.D.  
Deborah L. Roeber, Ph.D.

## Contacts and Resources

### Office of Student Finance

University of Minnesota  
200 Fraser Hall  
106 Pleasant Street S.E.  
Minneapolis, MN 55455  
612-624-1111  
helpingu@umn.edu

### Office of Academic and Student Affairs

University of Minnesota  
College of Veterinary Medicine  
108 Pomeroy Center  
1964 Fitch Avenue  
St. Paul, MN 55108  
612-624-4747  
dvminfo@umn.edu

### Resident Classification and Reciprocity Office

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130 Coffey Hall  
1420 Eckles Avenue  
St. Paul, MN 55108  
612-625-4733

or

### Resident Classification and Reciprocity Office

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240 Williamson Hall  
231 Pillsbury Drive S.E.  
Minneapolis, MN 55455  
612-625-6330

### Office of the Registrar

University of Minnesota  
130 Coffey Hall  
1420 Eckles Avenue  
St. Paul, MN 55108  
612-624-1111  
helpingu@umn.edu

Compared to other institutions I spoke with, the University of Minnesota treated me with the greatest respect. They obviously care a great deal for their students personally and professionally...I feel at home here.

*Andrea, Class of 2010*

### VetFAST

University of Minnesota  
College of Veterinary Medicine  
108 Ben Pomeroy Center  
1964 Fitch Ave  
St. Paul, MN 55108-6188  
612-624-4747

### College of Food, Agricultural and Natural Resource Sciences

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# St. Paul Campus

