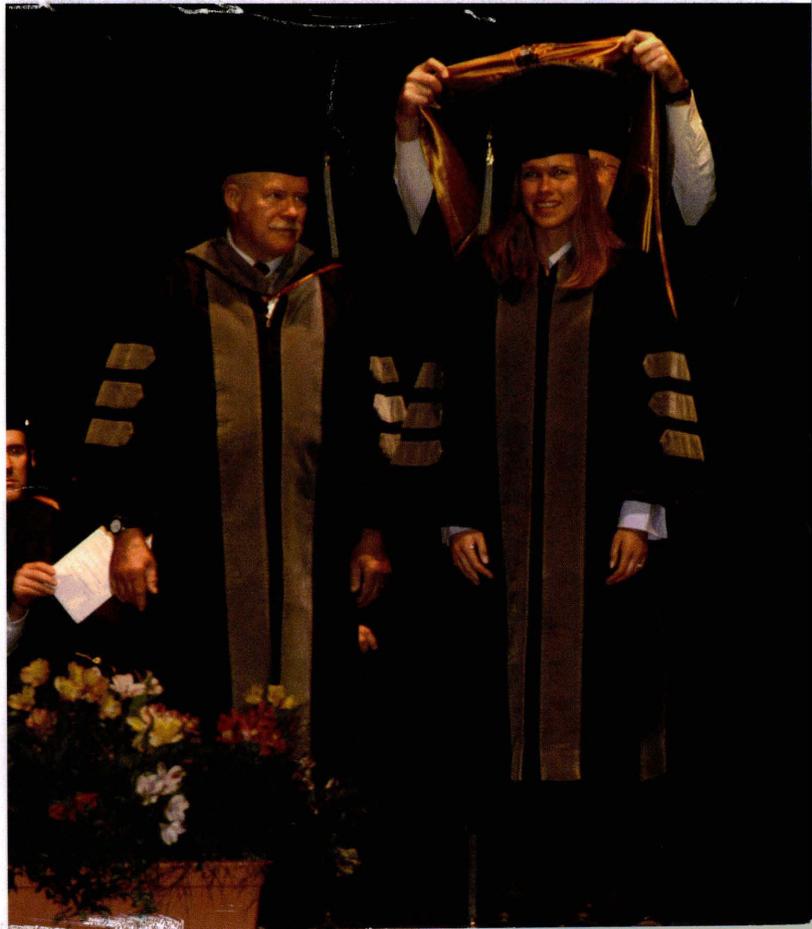
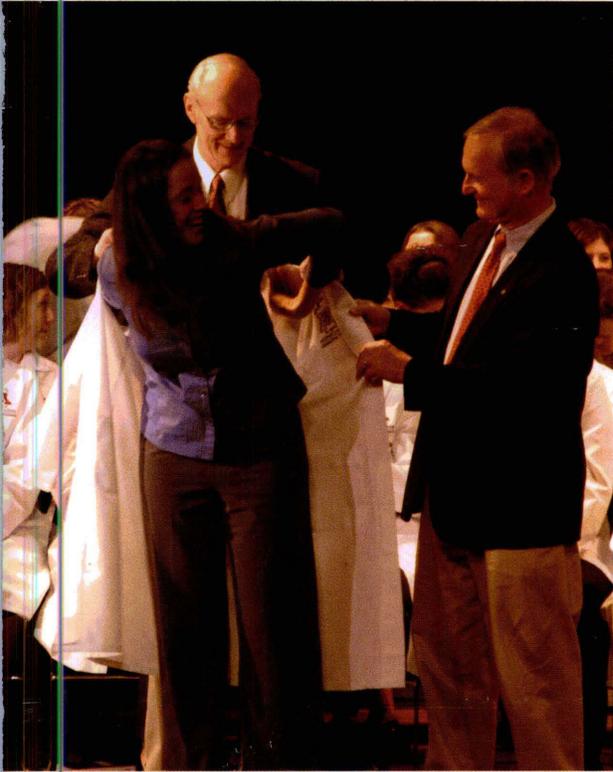
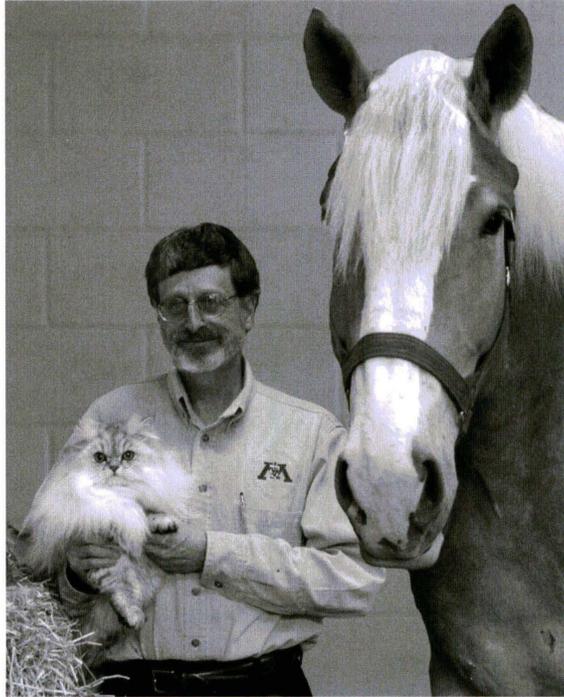




# College of Veterinary Medicine 2006–08 Catalog





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.

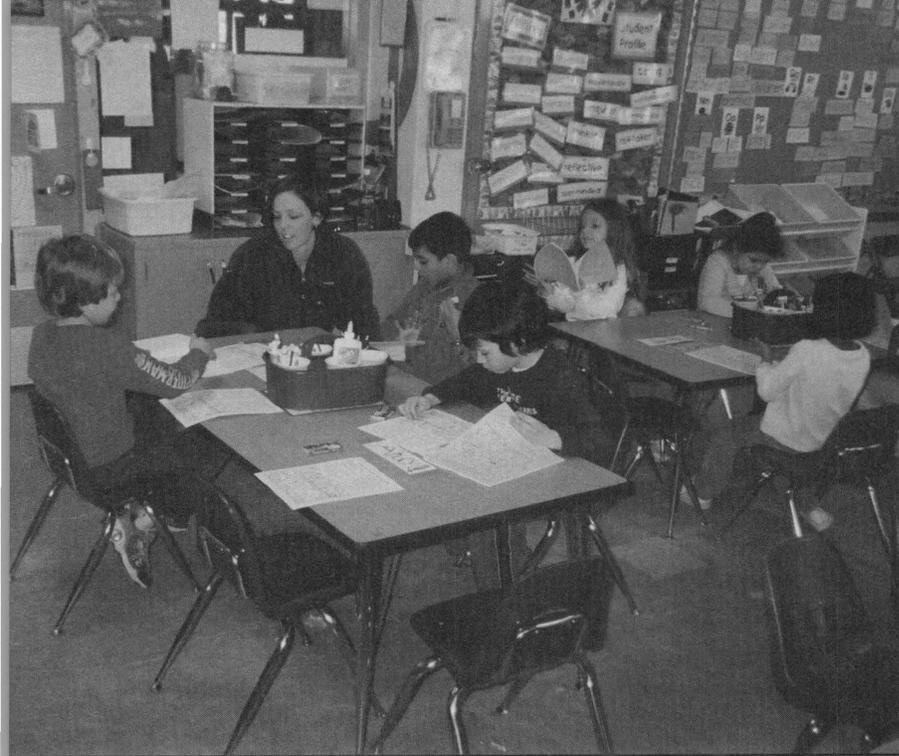
Together, the faculty, staff, and students of the College of Veterinary Medicine have built one of the nation's finest educational enterprises. Our graduates prove it every day.

Jeffrey S. Klausner, D.V.M.  
Dean

# College of Veterinary Medicine

## 2006–08 Catalog

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## **Congratulations on your decision to study at 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.

*"During my entire first year of vet school, I can honestly say that every instructor was so very knowledgeable, experienced and excited about sharing their knowledge with us as students. I never felt it was a drag for them to be lecturing, but rather it seemed they looked forward to helping us learn. I have taken classes at several schools, and this one has been the best!"*

*Kristin, Class of 2008*

## **The University of Minnesota College of Veterinary Medicine welcomes your application for admission into our programs.**

At the University of Minnesota, you will benefit from an innovative curriculum that combines practical 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 a tremendous 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 from which to choose: a doctor of veterinary medicine (D.V.M.) degree, a dual D.V.M./master of public health degree, a dual D.V.M./Ph.D. degree program, an M.S. or Ph.D. in basic and clinical sciences. You will choose to care for companion animals, support agribusiness through food animal medicine, advance the conservation of wildlife, or pursue a scientific career in biomedical research. You will also decide whether to 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 answers to any of your 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. Faculty members working with our M.S. and Ph.D. students are outstanding, and their research projects are on the cutting-edge.

### 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—ranging from the study of ethics to conducting biomedical research.

### 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 Minneapolis–St. Paul 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. It's a great place to work and live.

### 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 and the Veterinary Diagnostic Laboratory, and the Raptor Center.



*“The D.V.M./M.P.H. program gives you a feel for the impact of veterinary medicine on the real world. Even as vet students, we are able to show those already in the public health field the importance of veterinary medicine. It puts things into perspective for all of us.”*

*Kara, Class of 2006*



## College of Veterinary Medicine Points of Pride

### Innovative Education and Experiential Learning

- An integrated curriculum gives students the opportunity to 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 non-technical areas.
- Students choose from five specialized tracks (small animal, equine, food animal, mixed animal, and interdisciplinary).
- Fourth year students choose from over 60 rotations ranging from A to Z—“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 enables students to gain real-world experience by helping government agencies respond to critical public health issues such as Chronic Wasting Disease.
- Transforming the historical dairy barn is allowing the college to create the new Ben Pomeroy Student-Alumni Learning Center, which will provide a high tech classroom, commons area, and more.
- Ground has been broken for a new equine facility, which will include state-of-the-art technology for the treatment of equine patients.

### 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.

- College faculty led the team that sequenced the genome of the causative agent of Johne's disease, a hard-to-diagnose, deadly disease that affects dairy cattle. This major, long-sought breakthrough opens the door to better diagnostics and preventive vaccines.
- A college faculty member co-invented the Gentle Leader, one of the most widely used tools for dog behavior modification. This device was named one of the top 100 inventions of the twentieth century by the Smithsonian Institution.
- When a worldwide outbreak of Porcine Respiratory and Reproductive Syndrome (PRRS) 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 on confirming these data while continuing to work on identifying this gene in other breeds.
- A scientific breakthrough representing the first entire genome of a veterinary pathogen to be sequenced was made by a team of researchers lead by a faculty member of the college
- By studying the epidemiology of urinary stones and then using information about associated risk factors to design studies of the underlying causes of stones, the Minnesota Urolith Center continues to take the lead in development of safe, effective, and affordable methods to medically dissolve and prevent uroliths.

#### 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 care in all of the specialty areas including dentistry, pet behavior modification, oncology, and complementary care.
- The Veterinary Diagnostic Laboratory is a leader in high volume testing, processing more than 1 million submissions annually from the United States and abroad. The lab is nationally known for its unique molecular diagnostics, which provide faster, more accurate results.
- The Center for Animal Health and Food Safety proactively contributes to the safety and security of the global food system and significantly strengthens our ability to anticipate and respond to threats from animal and foodborne diseases.
- 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.

- 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.

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*"During my interview, I genuinely felt welcomed at the University of Minnesota. Immediately, I sensed this was a program where I would be successful, and I chose Minnesota over my home state program."*

*Sarah, Class of 2009*

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#### Outstanding Graduates

- JoAnne Bowman—first female veterinarian in the Army Veterinary Corps
- Phyllis Kanki—received a \$25 million grant to prevent the spread of AIDS in Nigeria.
- Stan Kleven—has 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.

#### Alisen Vetter

In her role as a Research Scientist at Medtronic, Inc., Dr. Vetter was responsible for leading a global team of physicians and engineers in the development of a new pacemaker that, for the first time in the history of cardiac pacing, treats congestive heart failure as well as abnormally slow heartbeats. Since the market release of this cardiac pacing system, thousands of patients around the world have found relief from the symptoms of congestive heart failure. In many cases, drug therapies had failed to relieve their symptoms and the new pacemaker therapy was their last hope. Some patients have even been taken off the waiting list for a heart transplant because of the effectiveness of the new pacemaker in treating their cardiac disease.



## 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.), a master of science (M.S.), a doctor of philosophy (Ph.D.) degree in comparative and molecular biosciences or in veterinary medicine, or a 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 of the D.V.M. program, you will study the normal animal, the pathogenesis of diseases, and the prevention, alleviation, and clinical therapy of diseases. The D.V.M. program concludes with 14 months of clinical rotations in the Veterinary Medical Center, during which you will learn 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 12–15.

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

The Veterinary Public Health Program is one of the first in the nation and the largest that allows veterinary students to simultaneously earn a D.V.M. and a master's degree in public health (M.P.H., at least 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 to the School of Public Health for admission to the Veterinary Public Health program. See [www.sph.umn.edu](http://www.sph.umn.edu).
- You may take M.P.H. coursework the summer before and along with the D.V.M. curriculum. The coursework includes some 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 costs down, you are allowed (with approval) to transfer up to 14 credits of graduate or professional coursework to the M.P.H. program.
- During your four years in the program, you will 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 tuition costs are separate from those of the College of Veterinary Medicine.

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## Interested in food animal medicine? Check out VetFAST

VetFAST, the Veterinary Food Animal Scholars Program, encourages students to pursue food 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 in the College of Food, Agricultural and Natural Resource Sciences to

- Receive an admissions decision from the College of Veterinary Medicine at the end of the first year of college, instead of the third or fourth year.
- Complete your B.S. and D.V.M. degrees in seven years instead of eight.
- Waive the GRE requirement as part of your 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 1365 Gortner Avenue, St. Paul, MN 55108-6188, 612-624-4747 or the College of Food, Agricultural and Natural Resource Sciences 1420 Eckles Avenue, St. Paul, MN 55108-6188, 612-624-3045.

#### 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 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.

**B.S. in Veterinary Science**—This limited option is for students who complete their undergraduate veterinary college prerequisites in three years or less and did not complete a baccalaureate degree. Rather than working another year at the undergraduate level, and provided you are accepted into the College of Veterinary Medicine, you earn your B.S. after completing the first year of the veterinary curriculum. The B.S. degree gives you the credentials you need to pursue graduate and specialty education programs.

## 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 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 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 of specific, spontaneously-occurring diseases in susceptible animal populations.
- Surgery/Radiology/Anesthesiology focuses on the assessment of morphology, physiology, and pathophysiology through imaging (radiology); the restoration of health through surgical management (surgery); and the management of pain (anesthesiology) and pathophysiologic catastrophes (critical care).
- Theriogenology focuses on basic, applied, and clinical reproduction in domestic animals.

**Curriculum:** Specific course requirements are minimal, allowing students and advisers to 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. Elective courses are identified with the assistance of the adviser.

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

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*"I was impressed by the summer classes offered at the Public Health Institute. In particular, the avian influenza class was both enlightening and frightening. This course left a lasting awareness in my life."*

*Sarah, Class of 2009*

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The comparative and molecular biosciences program offers admission primarily for fall semester. The application deadline for fall semester is January 15. Typically, four or five Ph.D. students and three MS 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 program has an application deadline of 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, and the University of Minnesota have hired the college's graduates as post-doc scientists, post-doc 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 coordinator at [cvmmsphd@umn.edu](mailto:cvmmsphd@umn.edu) or 612-624-7413. 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/ResearchandGradProg/GradPrograms/VMGP](http://www.cvm.umn.edu/ResearchandGradProg/GradPrograms/VMGP)) contain detailed information regarding the programs. The Graduate School's Web site ([www.grad.umn.edu](http://www.grad.umn.edu)) contains application information.



The **Summer Scholars** program allows first- and second-year veterinary students to conduct independent biomedical research under the supervision of a faculty mentor and gain experience in laboratory techniques, experimental design, use of controls, data interpretation, and statistical evaluation of data. Projects address problems of veterinary importance or utilize animal models of human disorders. Additional activities in the program have included field trips to research laboratories at the Minnesota Department of Health and Medtronic. Participants may attend a national research symposium with students from across the country. Summer Scholars is strengthened by its collaborative endeavors with the other colleges in the Academic Health Center (primarily Medicine and Public Health) and its close ties to the College of Food, Agricultural and Natural Resource Sciences. Its specific areas of expertise include infectious disease, food safety, genetics and genomics, and comparative medicine (pathology, oncology, urology).

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*“I am so impressed with the faculty and their desire to teach students. So many have gone above and beyond to ensure students’ understanding, including extra projects, individual meetings, class review sessions, etc. I feel fortunate to have a wealth of knowledge available in such generous people.”*

*Shana, Class of 2007*

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## 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 other students it might be during third year of college. About 20 percent of our students enter the D.V.M. program without completing their bachelor’s degree first. The application deadline for the D.V.M. program is October 1—almost one full year in advance of the first semester for which you enroll.

### D.V.M. Application Procedure

You must submit your application for the next fall by October 1—nearly one year in advance. The college belongs to the national Veterinary Medical College Application Service (VMCAS), which means that you may use one application to apply to any of the veterinary colleges belonging to VMCAS. You may submit your application online at [www.vmcas.org](http://www.vmcas.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 2006–07 academic year.

#### 2006–07 Yearly Tuition rates and estimated expenses

Resident .....	\$19,418
North Dakota residents .....	\$28,010
Nonresident .....	\$36,855
Student services fee .....	\$610
Computer .....	\$1,400
Books, lab equipment, notes, dissecting set, and supplies .....	\$1,600
Health Insurance (if needed) .....	\$1,798

*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 of October 1. 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. These students would be charged 75 percent of nonresident tuition rates. Any refund of the nonresident fees by the state of North Dakota would be at the discretion of the North Dakota Board of Higher Education. 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

Following are the areas of study and number of semester credits 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 ..... 3–5 credits with lab
- Zoology or animal biology ..... 3–5 credits with lab
- Genetics..... 3–5 credits  
Should include the mechanisms of heredity and their applications.
- Microbiology..... 3–5 credits  
An introductory course with lab that includes taxonomy, morphology, physiology, and ecology of microbes.

#### Chemistry (17–27 credits)

- General chemistry with lab ..... 8–12 credits
- Organic chemistry with lab..... 6 credits, two quarters or one semester
- Biochemistry with or without lab..... 3–5 credits

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

- History and social science ..... 6–9 credits  
Anthropology, economics, geography, history, political science, psychology, social science, and sociology courses can usually be used to fulfill this requirement.
- Arts and humanities..... 6–9 credits  
Art, literature, and music courses can usually be used to fulfill this requirement as can many humanities, theater, and foreign language literature courses.

#### 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 2006 Successful D.V.M. Applicants

Applications.....	916
Resident .....	204
Nonresident .....	712
GPA in required courses (mean).....	3.51
GPA last 45 semester credits (mean).....	3.65
GRE Verbal and Quantitative: combined score (mean) .....	1,170



### 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, which provide an opportunity for you to visit campus and learn more about the DVM degree program, selection criteria, and application procedures and to 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 if 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. In addition, each of the four classes has a faculty adviser who can answer your questions and help guide your educational experience.
- **Financing your education**—Finding the financial resources to fund your education is an important aspect of pursuing a veterinary program. The Office of Student Finance (financial aid) can provide answers, along with on-site financial aid counseling in the College of Veterinary Medicine at the start of each semester. The Academic and Student Affairs Office can provide 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
- Production Animal Medicine Club
- Holistic Medicine Club
- Equine Club
- Feline Club
- Sheep, Goat, and Llama Club
- Zoo, Exotic, Avian, and Wildlife Club
- Veterinary Business Management Association
- Emergency and Critical Care Society

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

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

### Housing Information

Need a place to live? Maybe we can help. 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, giving you a place to start your housing search. This information is sent to the newly admitted D.V.M. students in the late spring.

An additional resource is the University's off-campus housing site at [www.umn.edu/housing/offcampus.htm](http://www.umn.edu/housing/offcampus.htm). The University maintains two family housing sites, one on the St. Paul campus. The Housing and Residential Life home page can be found at [www.umn.edu/housing](http://www.umn.edu/housing).

## After Graduation: Staying Connected

### Continuing Education

Your education doesn't stop once you receive your degree. You'll want to expand your knowledge and skill base through 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. Our continuing education programs offer an opportunity to:

- Hear nationally and internationally known experts lecture on different 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.

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*"The UMN Veterinary Medical Center is one of the most cooperative environments I've ever enjoyed working in, and the clinicians are as dedicated to their students as they are their patients. I loved the level of medicine practiced here, and will happily recommend the U to anyone thinking of bringing their pets here."*

*Catherine, Class of 2006, Ross University*

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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 to learn about upcoming learning opportunities.

### Alumni and Friends

Once you receive your degree from the University, that doesn't mean your relationship with the college has to end. In fact, all graduates are 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 will include your first surgery labs.
- The third year will conclude your classroom learning of organ system disorders. You will also start to focus heavily on the species of most interest to you in advanced courses.
- 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.

## First Year

Fall Semester		Credits
CVM 6000	Orientation to Veterinary Medicine	1
CVM 6011	Professional Skills	2
CVM 6021	Overview of Animal Populations I	1
CVM 6100	Veterinary Anatomy	5
CVM 6101	Normal Radiographic Anatomy	1
CVM 6110	Veterinary Physiological Chemistry	3
CVM 6111	Histology	3
CVM 6134	Principles of Veterinary Nutrition	1
CVM 6301	Clinical Skills I	1
Total.....		18

### Spring Semester

CVM 6012	Professional Skills	2
CVM 6022	Overview of Animal Populations II	1
CVM 6112	Organology	3
CVM 6120	Veterinary Neurobiology	2
CVM 6130	Veterinary Physiology	4
CVM 6141	Veterinary Pharmacology	2
CVM 6201	Host Defenses	3
CVM 6204	Infectious Agents: Virology	1.5
CVM 6211	Applied Veterinary Genetics	1
CVM 6302	Clinical Skills II	1
CVM 6441	Behavior Core	2
Total.....		22.5

Plus selected electives from Optional Elective Choices list shown on pages 13-14

## Second Year

### Fall Semester

CVM 6013	Professional Skills III	2
CVM 6202	Infectious Agents: Parasitology	4
CVM 6203	Infectious Agents: Bacteriology	3.5
CVM 6205	Infectious Agents: Pharmacology	1
CVM 6220	Clinical Epidemiology or	
CVM 6222	Advanced Clinical Epidemiology	2
CVM 6300	Veterinary Pathology	7
CVM 6303	Clinical Skills III	1
CVM 6840	Swine Core	2
Total.....		22.5

### Spring Semester

CVM 6014	Professional Skills IV	2
CVM 6102	Veterinary Imaging I	2
CVM 6132	Reproductive Biology	3
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	
	Diagnosics	1
CVM 6534	Veterinary Clinical Pathology	3
CVM 6880	Avian Core	2



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 members of a class. The curriculum offers flexibility in scheduling, a highly integrated approach to course topics, clinical coursework early in the program, and opportunities for students to develop professional practice skills before the fourth-year clinical rotations. The fourth-year clinical rotations offer students flexibility in selecting topics to be included in the final phase of their D.V.M. program. A breakdown of the program follows:

Total..... 32  
 Plus selected electives from Optional Elective  
 Choices list shown on pages 13–14

### Third Year

#### Fall Semester

CVM 6103	Veterinary Imaging II	2
CVM 6195	Veterinary Toxicology	3
CVM 6305	Clinical Skills V	1
CVM 6410	Large Animal Digestion 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.....		20

In addition, fall semester 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	1
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 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.....		7

In addition to the above spring semester requirements, 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.
- successfully complete three 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	1
CVM 6104	Small Animal Ultrasonography	1
CVM 6136	Small Animal Nutrition Advanced Block	2.5
CVM 6306	Small Animal Clinical Skills Advanced Block	1
CVM 6404	Small Animal Dermatology Advanced Block	1

CVM 6414	Small Animal Liver and Pancreas Disorders Advanced Block	1
CVM 6424	Small Animal Orthopedic Advanced Block	1
CVM 6434	Critical Care Advanced Block	1
CVM 6436	Small Animal Cardiology	1
CVM 6442	Small Animal Behavior	1
CVM 6461	A Clinician's Analysis of Urinalysis	1
CVM 6464	SA Urinary Systems Disorders: Case Based Discussion	1
CVM 6471	Problems in Small Animal Medicine	1
CVM 6482	Reproductive Diseases of Small Animals	1
CVM 6497	Avian Medicine and Surgery	1
CVM 6685	Small Animal Diagnostic Technique Lab	1
CVM 6702	Large Animal Palpation Labs	1
CVM 6704	Reproductive Diseases of Cattle	2
CVM 6720	Problem Solving in Equine Medicine	1
CVM 6727	Equine Palpation Lab	1
CVM 6728	Reproductive Diseases of the Horse	1

*"Clinics were the best part of veterinary school. They gave us all the opportunity to apply the knowledge we had accumulated in our courses—and allowed us to connect and learn from clinicians in a more informal way."*

*Meghann, Class of 2006*

CVM 6730	Equine Advanced Elective	3
CVM 6731	Equine Advanced Elective: Surgical Supplement	1
CVM 6790	Advanced Small Ruminant Practice	1.5
CVM 6800	Bovine Palpation Lab	1
CVM 6801	Advanced Dairy Production Medicine	1
CVM 6802	Large Ruminant Clinical Elective	3
CVM 6803	Advanced Bovine Practice Lab	2
CVM 6805	Food and Exotic Large Animal Anesthesia	.5
CVM 6841	Swine Behavior	1

#### Optional Elective Choices:

CVM 6050	Perspectives: Interrelationships of People and Animals in Society	2
CVM 6307	Clinical Skills Elective	1
CVM 6443	Preparing and Teaching Puppy Classes	1.5
CVM 6481	Obstetrics Lab	1
CVM 6545	Introduction to Regulatory Medicine	2
CVM 6560	Public Health Issues and Veterinary Medicine Opportunities	1
CVM 6690	Integrative Medicine	2.5
CVM 6718	Large Animal Community Based Practice Mentoring	1
CVM 6721	Neonatology	1
CVM 6722	Clinical Anatomy of the Equine Limb	1

*“I had not considered the public health field before starting vet school, but the University of Minnesota DVM/MPH program is quite compelling, providing the ability to complete both degrees in the same time frame. I have expanded my horizons in this program and the opportunities appear limitless.”*

*Christy, Class of 2008*

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 specific track. Each track has specific requirements, allowing us to create specialized learning experiences for you.

- 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.
- Successfully 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 (required for all tracks except the interdisciplinary track)
- 7 selected rotations based on the track requirements (except the interdisciplinary track)
- 6–8 elective rotations or 18 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  
 Minnesota Zoological Medicine  
 Necropsy  
 Private Practice Preparedness  
 Radiology: Mixed Animal  
 Raptor Center  
 Veterinary Acupuncture  
 Veterinary Public Health  
 Veterinary Toxicology

#### Equine

Equine Dentistry  
 Equine Podiatry  
 Equine Sports and Preventive Medicine  
 Equine Theriogenology Introduction  
 Equine Theriogenology Advanced  
 Large Animal Diagnostic Ultrasonography

#### Food Animal

Advanced Building Design  
 Advanced Dairy Production Medicine and Nutrition  
 Advanced Feedlot Herd Health  
 Advanced Swine Health and Production  
 Biosecurity in the Poultry Industry  
 Bovine Surgery  
 Camelid Medicine, Surgery, Reproduction, and Health Management  
 Dairy Diseases: Prevention, Treatment and Food Quality  
 Dairy Production Medicine  
 Dairy Theriogenology Palpation  
 Directed Studies in Dairy Production Medicine  
 Epidemiology and Biostatistics  
 Farm Animal Reproduction and Delivery Management  
 Food Animal Disease and Diagnostics  
 Introduction to Swine Health and Production  
 Principles of Population Based Diagnostics and Therapeutics  
 Swine Disease Diagnostics, Therapeutics, and Prevention  
 Swine Production Systems  
 Small Ruminant Health and Production  
 Topics in Dairy Production Medicine I: Mastitis and Economics  
 Topics in Dairy Production Medicine II: Nutrition and Cow Management  
 Topics in Dairy Production Medicine III: Theriogenology and Youngstock Management  
 Transition Dairy Cow Management and Clinical Care

#### Large Animal

Large Animal Medicine  
 Large Animal Surgery and Lameness



### *Other*

- Directed Studies—Pathobiology
- Directed Studies—Diagnostic Medicine
- Directed Studies—Large Animal
- Directed Studies—Small Animal
- External Rotation in Public Veterinary Practice
- Externship
- Externship in Public Health Practice
- Masters Project: Public Health Practice
- Orientation to Clinics
- Public Policy
- 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
- Small Animal Surgery
- Small Animal Theriogenology
- Small Animal Ultrasound
- Veterinary Dentistry Rotation

## **Policies**

### **Academic Calendar**

The University follows a semester schedule, with fall semester beginning in September, spring semester beginning in January, and summer semester beginning in May.

### **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/onestop/Grades\\_Transcripts/RecordsPolicy.html](http://onestop.umn.edu/onestop/Grades_Transcripts/RecordsPolicy.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/onestop>.

### 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.

### 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 Jan Williams, Office of the Dean, 457 VMC, 1365 Gortner Ave., St. Paul, MN 55108, 612-624-6228.

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



### 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 Admissions and Scholastic Standing Committee (ASSC), 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 ASSC, 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. S/he will first be referred to the Associate Dean for Academic and Student Affairs. Cases will then be presented to the Admissions and Scholastic Standing Committee 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 ASSC, 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 ASSC 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 ASSC. Readmission to the college is at the discretion of the ASSC with consent of the faculty.

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*"The staff, both administrative and within the hospital, make such efforts to assist and encourage the students in the learning process. They are the backbone of the college and the hospital, and take that role seriously."*

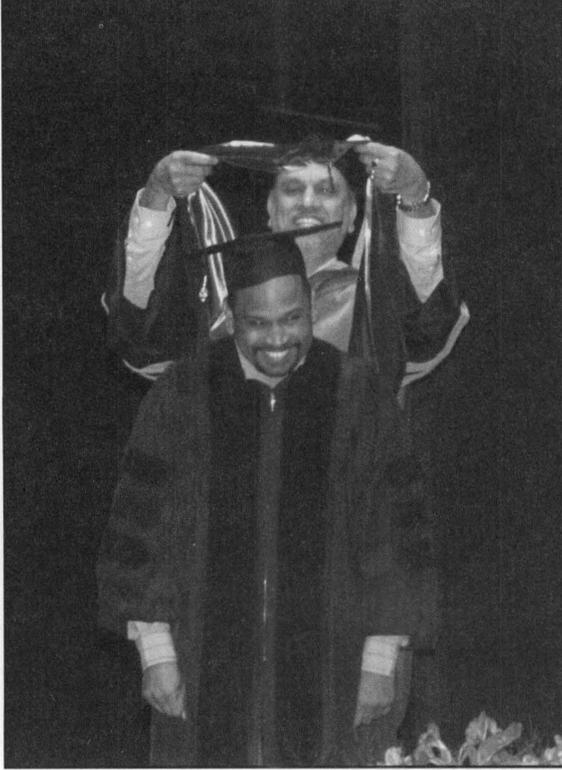
*Shana, Class of 2007*

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If readmission is granted, the ASSC 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  
419 Morrill Hall  
100 Church Street S.E.  
Minneapolis, MN 55455  
612-624-9547  
eoaa@umn.edu  
www.eoaffact.umn.edu

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*“The professors (doctors) here really care and really want us to succeed as veterinarians. They are always willing to spend the extra time to help us understand the material.”*

*Melissa, Class of 2007*

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### **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/onestop>.

### **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 ASSC to substitute for that requirement. Forms for this are available in the Academic and Student Affairs Office, 460 Veterinary Medical Center.

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

## Comparative and Molecular Biosciences (CMB)

**CMB 5180. Ecology of Infectious Diseases.** (3 cr \$PUBH 6180) 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 only. \$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) Five day course. Understanding/applying basic concepts of biotechnology. Lectures, hands-on lab experiments.

**CMB 5381. Pathogenesis of Infectious Zoonotic Diseases.** (3 cr. Prereq-[Grad student, [microbiology, biochemistry] courses] or #) Introductory 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 4 cr]; A-F only. Prereq-Jr) Special project, addressing specific issue in veterinary medicine, under guidance of faculty member.

**CMB 8100. Research Rotation in Comparative and Molecular Biosciences.** (4 cr [max 8 cr]; A-F only. Prereq-1st yr CMB grad student) Directed research laboratory 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.** (2 cr; A-F only. 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 only. 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. 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 8333. FTE: Master's.** (1 cr. Prereq-Master's student, adviser and DGS consent)

**CMB 8335. Molecular Biology Techniques.** (3 cr. \$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.

## 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 college offering the course is required for registration.

DGS..Director of Graduate Studies.

NGA..No grade associated. Course may be taken A-F or S-N.

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.

**CMB 8344. Mechanisms of Hormone Action.** (2 cr. 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. \$NSC 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 only. \$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]. Prereq-Grad CMB major) Directed research determined by student's interests, in consultation with faculty mentor.

**CMB 8444. FTE: Doctoral.** (1 cr. Prereq-Doctoral student, adviser and DGS consent)

**CMB 8481. Advanced Neuropharmaceuticals.** (4 cr; A-F only. \$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 8494. Research in Molecular Mechanisms of Disease.** (1-6 cr [max 18 cr]. Prereq-Grad CMB major) Directed research determined by student's interests, in consultation with faculty mentor.

**CMB 8550. Comparative and Molecular Biosciences Seminar.** (1 cr [max 8 cr]; S-N only. 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 only. 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 only. Prereq-Biol sciences grad student) Weekly seminar by primarily outside speakers discussing current issues.

**CMB 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]. Prereq-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**CVM 6013. Professional Skills III.** (2 cr. Prereq-DVM 2nd yr or #) Integrates subjects in veterinary professional curriculum. Introduction to and practice of professional skills. Communication, ethics, teamwork, leadership.

**CVM 6014. Professional Skills IV.** (2 cr. 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 I.** (1 cr; S-N only. Prereq-DVM 1st yr or #) Introduction to U.S. production animal agriculture at individual producer level and to roles veterinarians play.

**CVM 6022. Overview of Animal Populations II.** (1 cr; S-N only. Prereq-DVM 1st yr or #) Introduction to U.S. production animal agriculture at individual producer level and to roles veterinarians play.

**CVM 6027. Large Animal Practicum: Year 3.** (1 cr; S-N only. 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 only. Prereq-3rd or 4th yr DVM or #) Experience in team leadership in procedures/policies involved in after hours care of hospitalized/emergency cases in large-animal hospital.

**CVM 6029. Small Animal Intensive Care Practicum.** (1 cr [max 2 cr]; S-N only. Prereq-DVM 3rd or 4th yr or #) Management of dogs/cats requiring urgent medical care, intensive medical management. Provide 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 only. 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 only. 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.

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

**CVM 6045. Private Practice Preparedness.** (2 cr [max 6 cr]. Prereq-3rd or 4th yr DVM or #) Pet wellness, human resources, supervision, finance, customer service, conflict management, marketing.

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

**CVM 6100. Veterinary Gross Anatomy.** (5 cr [max 6 cr]; A-F only. 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.

**CMB 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]. 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]. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Veterinary Medicine (CVM)

**CVM 1000. Introduction to Veterinary Medicine.** (1 cr; S-N only) History of veterinary profession, careers within the profession, employment trends. Information about admission to DVM. Veterinary technology programs.

**CVM 6000. Orientation to Veterinary Medicine.** (3 cr; S-N only. 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 6011. Professional Skills I.** (2 cr; S-N only. Prereq-DVM 1st yr) Integrates subjects in veterinary professional curriculum. Introduction to and practice of professional skills. Communication, ethics, teamwork, leadership.

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



**CVM 6101. Normal Radiographic Anatomy.** (1 cr; A-F only. 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 only. 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 only. 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 only. 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 only. 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 only. Prereq-DVM 1st yr or grad student in biological or biomedical sciences) Structure/function of cells/tissues. Mechanisms by which animals digest, absorb, and metabolize carbohydrate, protein, lipid, and nucleic acids. Use of absorbed molecules to derive energy and maintain physiological processes. How end products are created/eliminated. Role of hormones and metabolically active tissues. Metabolic abnormalities. Recombinant DNA applications. Molecular aspects of growth/regulation of gene expression.

**CVM 6111. Histology.** (3 cr; A-F only. 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 only. 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 only. 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.** (4 cr; A-F only. Prereq-DVM 1st yr or #) Fundamental principles of systemic physiology. Relationships between forces and flows in biological systems. Overview of control system theory as it relates to neurohormonal regulation. Survey of major organ systems.

**CVM 6132. Reproductive Biology.** (3 cr; A-F only. Prereq-DVM 2nd yr or #) Physiology of reproduction, including lactation.

**CVM 6134. Principles of Veterinary Nutrition.** (1 cr; A-F only. Prereq-DVM 1st yr or #) Introduction to principles of nutrition. Basic applications and food sources for major domestic species.

**CVM 6136. Small Animal Nutrition: Advanced Block.** (2.5 cr. Prereq-3rd yr DVM or #) Nutritional considerations in health, treatment of disease in small animals.

**CVM 6137. Small Animal Clinical Nutrition.** (2 cr [max 6 cr]; S-N only. Prereq-3rd or 4th yr DVM or #) Students manage nutritional needs of patients, perform nutritional assessments of all ICU patients, perform nutritional consults, and see outpatient appointments.

**CVM 6141. General Veterinary Pharmacology.** (2 cr; A-F only. Prereq-DVM 1st yr or #) Principles of drug action, disposition, and clinical applications in animal patients. Therapeutic uses of drugs affecting autonomic nervous system, cardiovascular system, respiratory/digestive tracts, and kidneys. Therapeutic uses of anti-allergic/anti-inflammatory drugs.

**CVM 6142. Veterinary Neuropharmacology.** (1 cr; A-F only. 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 only. \$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.** (3 cr; A-F only. Prereq-DVM 1st yr or #) Introduction to classification, morphology, reproductive cycle, and epidemiology of infectious microbial agents of veterinary importance; properties of disinfectants; therapeutic uses of chemicals and drugs for sterilization, control, and treatment.

**CVM 6202. Infectious Agents: Parasitology.** (4 cr [max 7 cr]; A-F only. 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 only. 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.

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*"The faculty and staff I have encountered at the University of Minnesota College of Veterinary Medicine and School of Public Health have been wonderful. They obviously work very hard to ensure our education and experiences are the best available."*

*Christy, Class of 2008*

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**CVM 6204. Infectious Agents: Virology.** (3 cr; A-F only. 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 only. 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 only. 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.** (2 cr) Application of clinical epidemiologic concepts/methods in real-world veterinary animal and public health settings.

**CVM 6300. Veterinary Pathology.** (7 cr; A-F only. Prereq-DVM 2nd yr or #) Reactions of cells and tissues to injury and disease, including reversible and irreversible cell injury, disturbances of circulation, blood coagulation, and alterations of cell growth and multiplication. Pathology of body systems, emphasizing reactions of specific organs.

**CVM 6305. Clinical Skills V.** (1 cr; S-N only. 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 only. 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; 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 12 cr]. 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 only. 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 only. Prereq-DVM 2nd yr or #) Normal form and function, histopathologic reaction patterns, wound healing, and clinical disease states of the skin and adnexa (horns, mammary glands) of common domestic species.

**CVM 6404. Small Animal Dermatology: Advanced Block.** (1 cr; A-F only. Prereq-[3rd or 4th] yr DVM or #) Diagnostic/therapeutic considerations in small animal dermatology beyond core in preparation for clinical rotations.

**CVM 6410. Large Animal Digestive Disorders.** (2 cr [max 4 cr]; A-F only. Prereq-DVM 2nd 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. 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 only. Prereq-[3rd or 4th] yr DVM or #) Complicated diabetes mellitus, feline pancreatitis, and hepatic encephalopathy in dogs/cats. Lectures, small-group exercises.

**CVM 6420. Musculoskeletal System Diseases.** (2 cr; A-F only. 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 only. 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 only. Prereq-DVM or #) Pathophysiology, presentation, diagnostic presentation, therapeutic approaches, and management protocols for common disorders of the cardiovascular and pulmonary systems.

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*"Summer Scholars is an exceptional program! It is designed to provide opportunities which challenge and stimulate the research mind of motivated students striving to reach new depths of understanding."*

*Julie, Class of 2007*

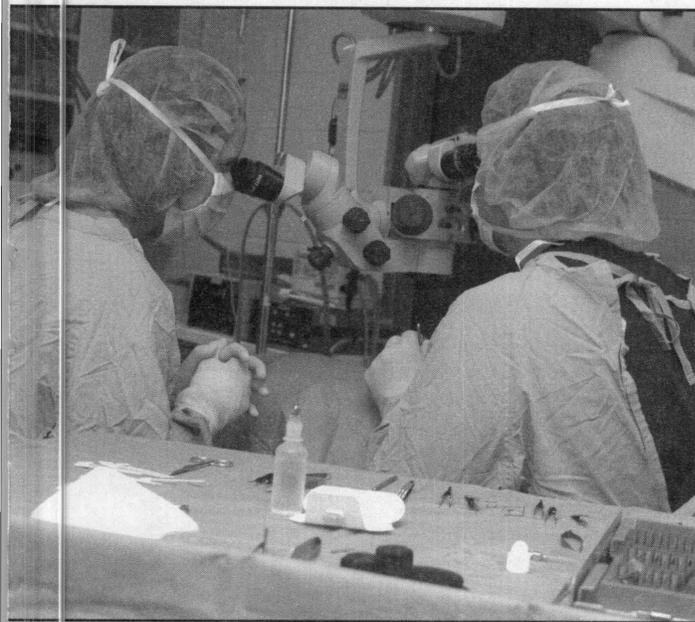
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**CVM 6301. Clinical Skills I.** (1 cr; A-F only. Prereq-DVM 1st yr or #) Domestic animal behavior. Basic animal handling/management skills. Clerk duty in both large- and small-animal hospitals is required. First of five-part series.

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

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

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



**CVM 6433. Hematology Elective.** (.5 cr; S-N only. Prereq-3rd yr DVM or #) Case based experience in interpreting/using hematology/chemistry results for small animals.

**CVM 6434. Critical Care: Advanced Block.** (1 cr; S-N only. 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 only. 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 only. Prereq-DVM 3rd yr or #) Pathophysiology, presentation, diagnostic approach, therapeutic approach, and management protocol for common neurologic/ophthalmologic disorders in domestic species.

**CVM 6441. Behavior Core.** (2 cr; A-F only. 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 only. Prereq-[3rd or 4th] yr DVM or #) Introduction to abnormal/undesired animal behavior, diagnostic procedures, and behavioral/pharmacological modifications.

**CVM 6443. Preparing and Teaching Puppy Classes.** (1.5 cr [max 2 cr]; S-N only. Prereq-[DVM 1st or 2nd yr or #], commitment to teach at least 5 Wed nights following completion of course; prev dog training experience recommended) Prepares students to teach in CVM puppy classes offered to public. Puppy socialization, reward-based training, pitfalls of using punishment, canine learning principles. Management of common puppy problems during ages 7 to 20 weeks. Students observe puppy classes and practice presentations. Lecture, lab.

**CVM 6444. Ophthalmology.** (2 cr; A-F only. 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 only. Prereq-DVM 2nd 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 6460. Urinary System Disorders.** (2 cr; A-F only. 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 only. Prereq-3rd yr DVM or #) Informal, case-based, interactive, in-depth approach to evaluation of urinalyses of clinical cases recently admitted to Veterinary Medical Centers. 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 only. 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 only. 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 only. 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 6480. Obstetrics.** (1 cr; A-F only. Prereq-2nd yr DVM or #) Diagnosis/management of reproductive diseases.

**CVM 6481. Obstetrics Lab.** (1 cr; A-F only) 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 only. 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 only. Prereq-3rd yr DVM or #) Obstetric manipulation in domestic species.

**CVM 6494. Small Animal Anesthesia Advanced Block Core.** (1 cr. 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 only. 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 only. 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.** (2 cr [max 6 cr]. Prereq-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]. 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.

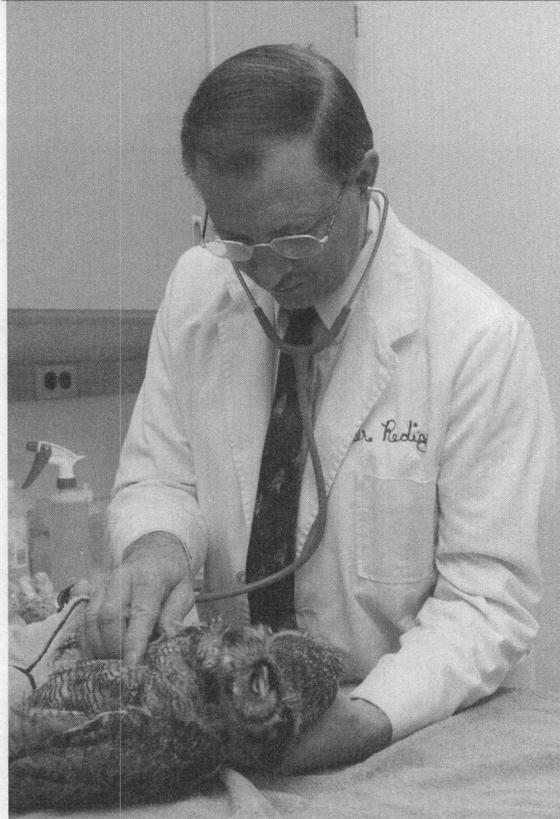
**CVM 6502. Necropsy.** (2 cr [max 40 cr]. Prereq-DVM 3rd or 4th yr or #) Students perform necropsies, collect tissues for lab analysis, interpret clinicopathologic findings, prepare reports on animals submitted to Veterinary Diagnostic Lab, apply basic/clinical science to diseases for animals and populations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

**CVM 6505. Topics.** (1-8 cr [max 160 cr]. Prereq-#) New or one-time-only course.

**CVM 6506. Directed Studies in Large Animal Medicine (DistL).** (2 cr [max 40 cr]; S-N only. 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 only. 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 only. 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 only. 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]. Prereq-DVM student or #) Directed field research. Original or secondary analysis of data sets related to public health practice.

**CVM 6515. Externship (Extern).** (2 cr [max 24 cr]; S-N only. 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]. \$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 6518. Public Policy.** (2 cr [max 6 cr]. Prereq-DVM 1st or 2nd or 3rd or 4th yr or MPH student or grad student or [jr or sr] animal sci student or #) Directed experiential learning in public policy making at state, national, or international level. Integration of knowledge/skills in animal health, public health, and food safety policy development. Travel may be required. Some financial support may be available. Occurs 1st or 2nd week of January or over summer. Faculty oversee students.

**CVM 6519. Wildlife Rehabilitation Center Summer Internship.** (2 cr [max 4 cr]. 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 only. 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]. 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]. 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]. 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]. 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]. 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).** (2 cr [max 4 cr]. Prereq-DVM 3rd or 4th yr or #) Cytology, hematology, clinical chemistry, urinalysis, clinical microbiology, endocrinology, virology, parasitology, immunology. Sample submission, laboratory test methodology. Covers all veterinary species. Emphasizes comparative laboratory medicine. Case-based learning, small group discussions, didactic teaching, microscopy.

**CVM 6534. Veterinary Clinical Pathology.** (3 cr; A-F only. 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 only. 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 only. §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.

**CVM 6560. Public Health Issues and Veterinary Medicine Opportunities.** (1 cr [max 2 cr]) 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]. 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]. 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 6603. Small Animal Internal Medicine: C.** (2 cr [max 4 cr]. Prereq-[6601, 6602, [3rd or 4th yr DVM], small animal track] or #) Students work with internal medicine clinical specialists in VMC, assisting with receiving, patient care, work-ups, and client communication. Students provide patient care on evenings/weekends for hospitalized patients, similar to cases assigned in SAM. High volume rotation designed to provide high quality service to referring community.

**CVM 6606. Emergency Rotation.** (2 cr [max 20 cr]. 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]. 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.

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*"As a first year DVM/MPH student, I found PHI 2005 to be an incredible experience. I met new classmates and many other individuals from various different occupations, backgrounds, levels of education, etc. The connections I have made and numerous things I learned, surpassed my expectations for the experience."*

*Noel, Class of 2009*

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**CVM 6630. Behavior (Beha).** (2 cr [max 8 cr]. 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]. 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]. 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]. 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]. 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 6651. Small Animal Ultrasound (SAUS).** (2 cr [max 8 cr]. 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. 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]. 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]. 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]. 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 6668. Small Animal Radiology (RAD).** (2 cr [max 4 cr]. 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]. 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]. 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; A-F only. 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 only. 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.

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*“Preceptorships and mini-rotations are invaluable experiences providing first and second year students opportunities to be involved in clinical settings. These were my absolute favorite parts of the year. Applying information learned in the classroom was exciting and heightened my enthusiasm to be a practicing veterinarian. I can’t wait until rotations.”*

*Shana, Class of 2007*

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**CVM 6648. Advanced Clinical Oncology Rotation.** (2 cr [max 4 cr]. 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 6691. Veterinary Acupuncture (AcPunct).** (2 cr [max 6 cr]. Prereq-[6690, [yr 3 or 4 DVM]] or #) Basic veterinary acupuncture theory, point combination, treatment, diagnosis of diseases, hands-on veterinary acupuncture technique.

**CVM 6702. Large Animal Palpation Labs.** (2 cr; A-F 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 only. Prereq-3rd yr DVM or #) Common diseases affecting reproductive function in cattle, swine, and small ruminants.

**CVM 6706. Epidemiology and Biostatistics (E&B).** (2 cr [max 16 cr]. \$VMED 7706. Prereq-DVM 4th yr or grad student or #) How to formulate questions, analyze problems, and develop solutions relating to food animal production systems. Excel, Access, and basic statistical programs. Design/evaluation of field trials. Epidemiology. Statistical process control. Field trips to apply data/results and consult with people in field.

**CVM 6709. Advanced Building Design.** (2 cr [max 16 cr]. \$VMED 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]. 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 6715. Large Animal Surgery and Lameness.** (2 cr [max 10 cr]. 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 6717. Large Animal Diagnostic Ultrasonography (LAUS).** (2 cr [max 4 cr]. 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. Opportunity to practice new clinical skills with a veterinarian who may serve as a mentor. Students visit the practice four times.

**CVM 6720. Problem Solving in Equine Medicine.** (1 cr; A-F only. Prereq-DVM 1st or 2nd or 3rd yr or #) Diagnosis of a case. Students are given a clinical sign or laboratory finding each week. Generation of differential diagnosis list, diagnostic plan.

**CVM 6721. Neonatology.** (1-2 cr [max 2 cr]; S-N only) 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 only. 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; A-F 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 only. 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 only. 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. 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 (EDen).** (2 cr. Prereq-3rd or 4th yr DVM or #) Small group lectures, demonstrations, labs. Hands-on dentistry on client-owned animals.

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

**CVM 6738. Equine Podiatry (EPod).** (2 cr [max 4 cr]. Prereq-DVM 3rd or 4th yr or #) Concepts of equine podiatry. Anatomy and physiology of foot and hoof. Labs to provide experience supporting lessons learned in lectures. Disease seminars and discussion of actual cases. Labs introducing basic techniques and methods of treatment for injuries.

**CVM 6747. Equine Theriogenology Introduction (ETHI).** (2 cr [max 16 cr]. 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]. 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 6794. Camelid Medicine, Surgery, Reproduction, and Health Management.** (2 cr [max 4 cr]. 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 6796. Advanced Feedlot Herd Health (Feedlot).** (2 cr [max 4 cr]. 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]. 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; A-F only. Prereq-DVM or #) Practice in diagnostic evaluation of bovine reproductive tract.

**CVM 6801. Advanced Dairy Production Medicine.** (1 cr; S-N only. 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 only. 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 only. 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]. 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 only. 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.

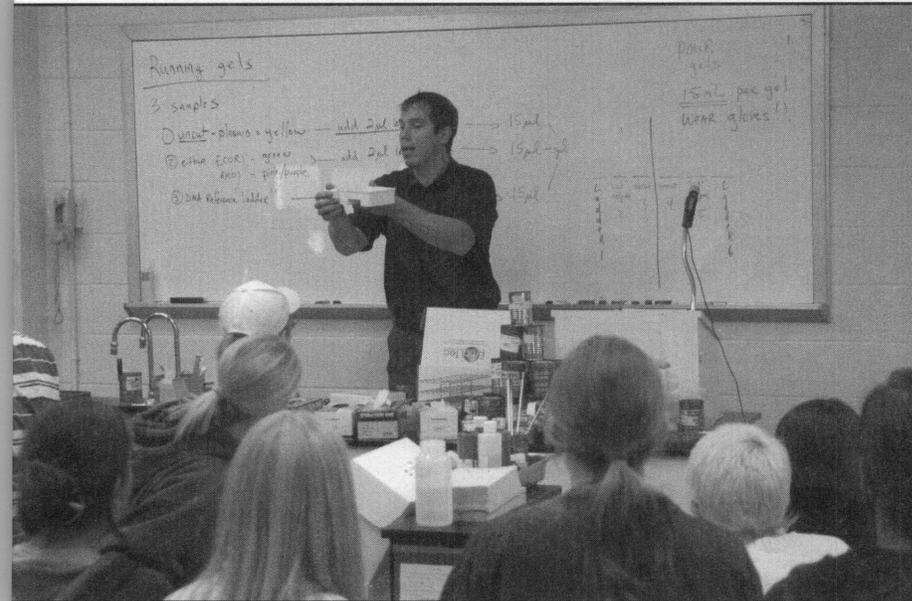
**CVM 6806. Food Animal Disease and Diagnostics.** (2 cr [max 4 cr]. Prereq-3rd or 4th yr DVM student or #) Two-week rotation. Food animal necropsies, diagnostic assays.

**CVM 6750. Equine Sports and Preventive Medicine (ESPP).** (2 cr [max 4 cr]. Prereq-DVM 3rd or 4th yr or #) Equine competitive disciplines and vet's role, economic/lifestyle issues unique to equine practice, tack, ethical issues. Principles of exercise physiology and performance testing. Vaccination programs, respiratory diseases, diagnostic techniques, facility design, environmental hygiene, optimization of air quality, practical/legal/ethical aspects of pre-purchase exam, insurance/vet's role, legal issues, physical therapy, massage, acupuncture, emergency first aid, strategies for insect control.

**CVM 6790. Advanced Small Ruminant Practice.** (1.5 cr [max 3 cr]; A-F only. 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]. 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 only. 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 6811. Dairy Theriogenology Palpation (DThP).** (2 cr [max 20 cr]. 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. Farm Animal Reproduction and Delivery Management.** (2 cr [max 4 cr]. 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.

**CVM 6818. Dairy Diseases: Prevention, Treatment, and Food Quality.** (2 cr [max 8 cr]. Prereq-3rd or 4th yr DVM or #) How to assist a dairy producer with implementing management practices necessary to control/treat commonly encountered dairy diseases.

**CVM 6821. Transition Dairy Cow Management and Clinical Care (TMF).** (2 cr [max 12 cr]. Prereq-3rd or 4th yr DVM student or #) Students assist in all aspects of routine day-to-day management of facility, write detailed report on practical delivery of standard therapeutic or management protocol. Students live in facility during most of rotation. Care of newborn calf, calving cow, later (first two weeks fresh) post-partum cow. Research projects, housekeeping, miscellaneous tasks.

**CVM 6824. Directed Studies in Dairy Production Management.** (2 cr [max 4 cr]) Students focus on specific areas of research interests.

**CVM 6825. Advanced Dairy Production Medicine and Nutrition.** (2 cr [max 4 cr]. Prereq-6818, 6826, 6827, 6828, 6829, [3rd or 4th yr DVM]) Integrated concepts from dairy production medicine rotations. Focuses on practical experience in analysis, formulation, and troubleshooting of rations for dairy cows. Determining quantity/quality of feeds. How cows move through dairy at different stages of production and in dry period. Students work with computerized ration programs. Feeding-management, monitoring cattle production, cow comfort, housing. Forage preservation/management.

**CVM 6826. Dairy Production Medicine.** (2 cr [max 4 cr]. Prereq-3rd or 4th yr DVM) Major topics of dairy production medicine. Major subsystems of production/management of a dairy as it relates to veterinary activities.

**CVM 6827. Topics in Dairy Production Medicine I: Mastitis/Economics.** (2 cr [max 4 cr]. Prereq-6818, 6826, [3rd or 4th yr DVM or #]) Tools/experience to evaluate herd mastitis problems, make recommendations, develop mastitis control programs, evaluate adequacy of milking system function, and provide therapy for clinical mastitis. Evaluation of a dairy herd, using biological/economic records. Consulting in evaluating a dairy's strengths/weaknesses, identifying causes of problems, and proposing solutions. Economic basis of dairying. Financial techniques for evaluating producer decisions and veterinary recommendations.

**CVM 6828. Topics in Dairy Production Medicine II: Nutrition and Cow Management.** (2 cr [max 4 cr]. Prereq-6818, 6826, 6827, [3rd or 4th yr DVM or #]) Applied nutrition of adult dairy cow. Topics in cow housing, comfort, lameness, and dairy production systems. Modern dairy production systems. Evaluation of feedstuff management, nutritional management. Aspects of cow management, including housing, stall design, manure management, ventilation, and grouping strategies that promote comfort, health, and performance. Lectures, labs, farm investigations.

**CVM 6829. Topics in Dairy Production Medicine III: Theriogenology and Youngstock Management.** (2 cr [max 4 cr]. Prereq-[6818, 6826, 6827, 6728, [3rd or 4th yr DVM]] or #) Applied therio management of adult dairy cow. Youngstock nutrition, health housing, management. Modern dairy production systems. Physiology of reproduction, pharmacology of reproductive hormones, pathology of reproductive abnormalities, reproductive management techniques, normal estrous behavior. Interactions of nutrition, housing, and disease prevention on health/growth of youngstock. Lectures, labs, farm investigations.

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

**CVM 6841. Swine Behavior.** (.5 cr [max 2 cr]. 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]. 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 6844. Swine Production Systems (SPdn).** (2 cr [max 4 cr]. SVMED 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]. 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.

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*"The professors were enthusiastic and passionate about their teaching, the course topics were interesting and stimulating. The course format encouraged engagement and provoked thought. The field trips were well planned and organized. I met lots of new friends and had a great time."*

*Wendy, Class of 2009*

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**CVM 6846. Swine Nutrition.** (2 cr [max 8 cr]; S-N only. 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.

**CVM 6850. Swine Records (SRec).** (2 cr [max 8 cr]. 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 6854. Introduction to Swine Health and Production.** (2 cr [max 12 cr]) 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]) 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]) 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 6865. Introduction to Swine Production Medicine.** (1 cr [max 2 cr]. 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]. Prereq-DVM or #) Avian nutrition, physiology, anatomy, and disease.

**CVM 6882. Companion Birds (ComB).** (2 cr [max 4 cr]. 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. 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 only. 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 6933. Zoological Medicine (MNZM).** (2 cr [max 20 cr]. 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 only. 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.

## Veterinary Medicine, Graduate (VMed)

**VMed 5060. Financial Planning for the Small Business and You.** (2 cr. Prereq-VMED grad student or #) Principles/practice of farm/personal finance, interpreting financial statements, calculating financial return, setting goals, budgeting, analysis of decision making, time value of money, comparisons on investments, portfolio diversification, analysis of risk, impact of asset allocation.

**VMed 5080. Problems in Veterinary Epidemiology and Public Health.** (1-3 cr [max 5 cr]; A-F only) Individual study on problem of interest to epidemiology or public health student.

**VMed 5082. Diagnostic Epidemiology of Infectious Diseases.** (2 cr. 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 only. 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 only. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMed 5165. Surveillance of Foodborne Diseases and Food Safety Hazards.** (2 cr. \$PUBH 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 5193. Dairy Decision Making in a Financial Context.** (2 cr; A-F only. 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]) 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 6 cr]; A-F only. Prereq-5210 recommended) 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 5212. Large Animal Diagnostic Ultrasonography.** (1 cr; A-F only. 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; A-F only. Prereq-Grad student, #) Microscopic pathology of basic dermatologic reactions and of variable disease states.

**VMed 5274. Diseases of the Urinary System.** (1 cr; A-F only. 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. 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 only. 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 only. 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]. 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]. 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. 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 5330. Veterinary Descriptive Histopathology.** (1 cr [max 2 cr]. 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.

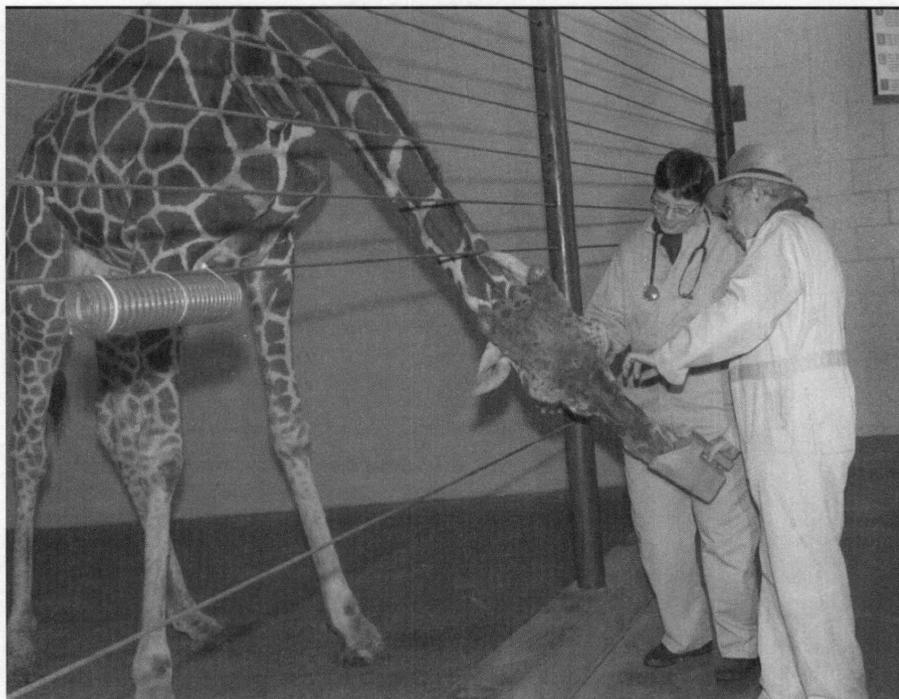
**VMed 5380. Veterinary Diagnostic and Comparative Pathology.** (2 cr [max 4 cr]. Prereq-[DVM/VMD or equiv degree] from a foreign institution, #, [resident or grad student] in [veterinary anatomic or clinical pathology]) Diagnostic skills in gross/microscopic pathology. Students participate in necropsy services of veterinary diagnostic lab, examine carcasses from wide 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 the senior necropsy rotation.

**VMed 5395. Problems in Veterinary and Comparative Pathology.** (3 cr. 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. 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 5493. Directed Studies in Infectious Disease.** (1-4 cr [max 8 cr]; A-F only. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMed 5496. Training in Swine Production and Management.** (4 cr. 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) Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.

**VMed 5621. Principles of Veterinary Anesthesiology.** (2 cr. 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. 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 only. 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 only. Prereq-Grad student, #) Directed studies arranged between student and instructor.

**VMed 5720. Small Animal Orthopedic Radiology.** (2 cr. Prereq-#) Roentgen signs of common bone diseases of small animals.

**VMed 5722. Large Animal Orthopedic Radiology.** (1-2 cr [max 2 cr]. Prereq-#) Roentgen signs of common bone diseases of large animals. Emphasizes the horse.

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

**VMed 8090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans.** (3 cr; A-F only. 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.** (2 cr; A-F only. §ANSC 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]) 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 only. Prereq-#) Discussions of diseases of organs or systems in animals, including degenerative, psychological, anomolous, 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 only. 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 only. Prereq-#) Detailed examination, treatment, and discussions of naturally occurring disease in patients admitted to Veterinary Medical Center.

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

**VMed 8220. Advanced Nephrology/Urology Clinics.** (1-3 cr [max 3 cr]. 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]. 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 only. 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 only. 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 only. 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]. Prereq-#) Individual research on selected problems

**VMed 8296. Advanced Large Animal Veterinary Medicine.** (1-3 cr [max 6 cr]; A-F only. 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. Prereq-Master's student, adviser and DGS consent)

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

**VMed 8393. Medical Conference.** (1-3 cr [max 6 cr]; A-F only) 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]. 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]. 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. Prereq-Doctoral student, adviser and DGS consent)

**VMed 8492. Seminar: Infectious Diseases and Swine Medicine.** (1-2 cr [max 2 cr]) 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]) Directed research.

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

**VMed 8520. Advanced Immunology.** (2 cr) Lectures and case presentations.

**VMed 8530. Advanced Swine Diseases.** (2 cr) Lectures and discussion on advances.

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

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

**VMed 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]. Prereq-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**VMed 8681. Advanced Small Animal Surgery.** (1-3 cr [max 3 cr]) Advanced techniques and procedures.

**VMed 8682. Advanced Large Animal Surgery.** (1-3 cr [max 6 cr]; A-F only. 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 only) Advanced techniques and problems.

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

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

**VMed 8686. Thoracic and Cardiovascular Surgery.** (2-4 cr [max 4 cr]; A-F only) 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 only. Prereq-DVM or equiv degree, #)

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

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

**VMed 8693. Seminar: Large Animal Surgery.** (1 cr [max 6 cr]; A-F only. 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 only)

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

**VMed 8696. Research in Critical Care/Emergency Medicine.** (1-3 cr [max 3 cr]. 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]. 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 only. 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 only. Prereq-[[CVM 6321, CVM 6322] or equiv], grad student) Active interaction around topics of advanced anesthesiology in veterinary species.

**VMed 8782. Advanced Veterinary Abdominal Imaging.** (1-3 cr [max 3 cr]) Applications and discussion of basic principles through emerging techniques.

**VMed 8783. Advanced Veterinary Thoracic Imaging.** (1-3 cr [max 3 cr]) Application and discussion of basic principles through emerging techniques.

**VMed 8784. Veterinary Therapeutic Radiology.** (2-3 cr [max 6 cr]) In-depth discussion of principles, practice, techniques, and complications.

**VMed 8785. Veterinary Nuclear Medicine.** (1-3 cr [max 6 cr]) In-depth discussion of principles, practice, techniques, and complications.

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

**VMed 8789. Research in Avian Clinical Problems and Procedures.** (1-3 cr [max 3 cr]; A-F only. 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 only. 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]) Current topics in veterinary imaging, veterinary radiation therapy, or specific applications.

**VMed 8793. Seminar: Veterinary Anesthesiology.** (1-2 cr [max 2 cr]; A-F only. 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]) 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]) 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 only. 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]. Prereq-Max 18 cr per semester or summer; 24 cr required)

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### College of Veterinary Medicine Administration

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

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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

### Department of Veterinary and Biomedical Sciences

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David Halvorson, D.V.M.  
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Kay Faaberg, Ph.D.  
Moses Njenga, Ph.D.  
Kent Reed, Ph.D.  
Mark Rutherford, M.S., Ph.D.  
Bruce Walcheck, Ph.D.

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Lyudmila Hart, B.A.  
Yinduo Ji, M.S., Ph.D.  
Randall Singer, D.V.M., Ph.D.  
Pamela Skinner, Ph.D.

#### Instructor

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

### Department of Veterinary Clinical Sciences

#### Professors

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Juan Romano, D.V.M., M.S., Ph.D.  
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Ashok Singh, Ph.D.  
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### *Veterinary Medical College Application Service (VMCAS)*

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www.vmcas.org

### *Disability Services*

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### *Health Careers Center*

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Minneapolis, MN 55455  
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www.healthcareers.umn.edu

### *Center for Health and Interdisciplinary Program (CHIP)*

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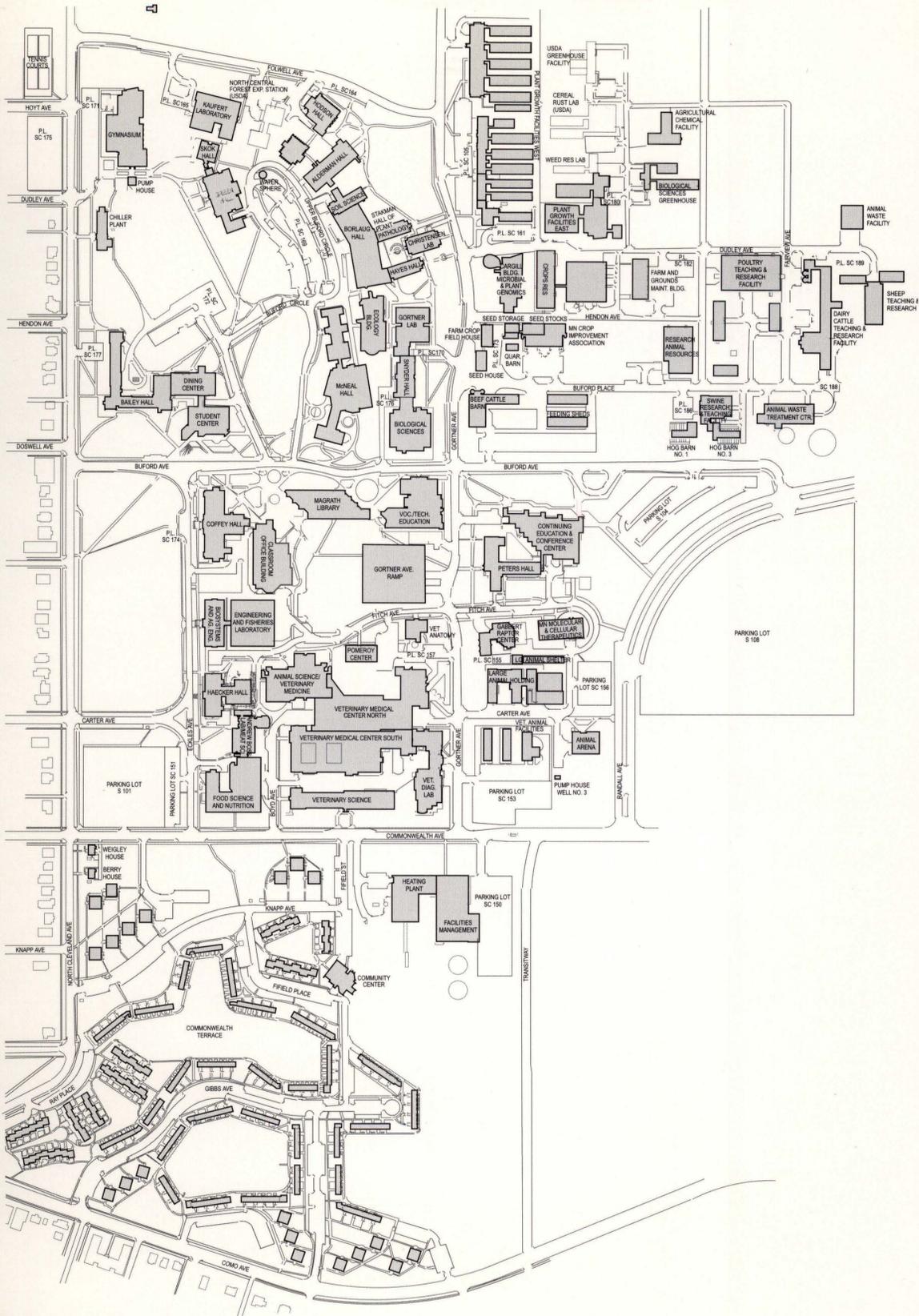
## World Wide Web Directory

University of Minnesota  
College of Veterinary Medicine  
[www.cvm.umn.edu](http://www.cvm.umn.edu)

University of Minnesota  
[www.umn.edu](http://www.umn.edu)

Veterinary Medical College  
Application Service (VMCAS)  
and the current  
*Veterinary College Application*  
[www.vmcas.org](http://www.vmcas.org)

# St. Paul Campus



## University of Minnesota College of Veterinary Medicine

460 Veterinary Medical Center  
1365 Gortner Avenue  
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### Our Mission and Values

The college's mission is to improve the health and well-being of animals and people through three core activities: educating future and current veterinarians and biomedical scientists; discovering and disseminating new knowledge and skills; and providing innovative veterinary services to the Twin Cities, Minnesota, and beyond.

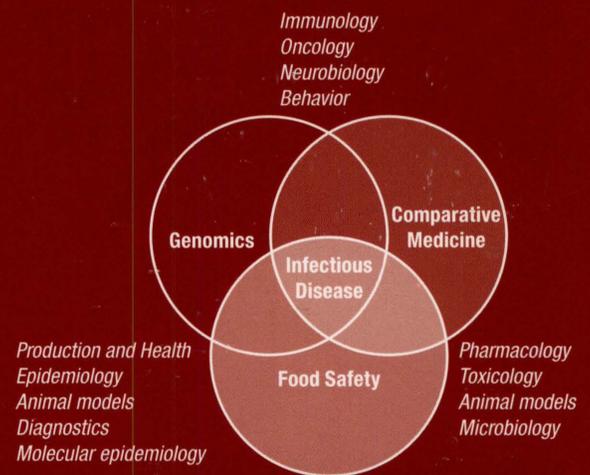
The college's staff and faculty are committed to expressing these values in everything we do:

- **Innovation**—We will enhance animal and human health through novel approaches to discovery and dissemination of knowledge and skills.
- **Learning**—We will be a community of learners offering exceptional lifelong educational opportunities.
- **Professionalism**—We will maintain the highest standards of honesty, integrity, and mutual respect.
- **Service**—We will provide innovative and compassionate service that exceeds our customers' expectations.
- **Communication**—We will facilitate open communication with all constituents to earn and sustain trust and understanding.
- **Collaboration**—We will develop and promote collaborative mission-related efforts.
- **Diversity**—We will have a diverse student body, faculty, and staff and will create a hospitable environment for all.

### Groundbreaking Research

We're proud to claim some of the greatest minds in veterinary research as part of our faculty and staff. The College of Veterinary Medicine is involved in cutting-edge research that has the potential to affect the lives of people across the country and around the globe. Here are our current areas of concentration.

#### Areas of Research



### Collaborating for a Greater Good

College of Veterinary Medicine scientists are committed to advancing the science of veterinary medicine by integrating their research and sharing their findings. Such collaboration is possible through multidisciplinary centers, including the following:

- Advanced Genetic Analysis Center
- Animal Biotechnology Center
- Avian Research Center
- Center for Animal Health and Food Safety
- Center for Dairy Health, Management, and Food Quality
- Minnesota Equine Research Center
- Minnesota Urolith Center
- Raptor Center
- Swine Center
- Swine Disease Eradication Center
- Veterinary Clinical Investigation Center