

Judy Hausser

CORNELL

U N I V E R S I T Y



College of Veterinary Medicine

1993-1994 Catalog

Cover: The new Veterinary Education Center, consisting of expanded lecture, laboratory, and library facilities, joins Schurman Hall and the Veterinary Research Tower.

Opposite: Dr. John F. Randolph, 1993 recipient of the Norden Distinguished Teacher Award, examines a canine patient with Holly Daly and Christina Maldonado, Class of 1994.

**Cornell University
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College of Veterinary Medicine

Cornell University 1993 - 1994



Academic Calendar for 1993-1994

Fall Semester	Class of 1997	Classes of 1995-96	Class of 1994
Registration	August 24, 25, 1993	August 24, 25 1993	
Instruction begins	August 26	August 26	May 24, 1993
Fall recess	October 9-12	October 9-12	
Thanksgiving recess	November 24-28	November 24-28	
Last day of classes	December 17	December 3	
Study period		December 4-8	
Examination period	November 8 - 11	December 9-17	
Spring Semester			
Registration	January 21, 1994	January 21, 1994	
Instruction begins	January 10	January 24	
Spring recess	March 19-27	March 19-27	
Last day of classes	May 13	May 6	May 23, 1994
Study period		May 7-11	
Examination period	January 24-26 May 16-20	May 12-20	
Commencement			May 29, 1994

This calendar is subject to modification and is not legally binding.

In enacting this calendar, the university has scheduled classes, laboratories, and examinations on religious holidays. It is the intent of the university that students who miss those activities because of religious observances be given adequate opportunity to make up the missed work.

It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, sexual orientation, age, or handicap. The university is committed to the maintenance of affirmative action programs that will assure the continuation of such equality of opportunity. Sexual harassment is an act of discrimination and, as such, will not be tolerated. Inquiries concerning the application of Title IX may be referred to Cornell's Title IX coordinator (coordinator of women's services) at the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801 (telephone: 607 255-3976).

Cornell University is committed to assisting those persons with disabilities who have special needs. A brochure describing services for persons with disabilities may be obtained by writing to the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801. Other questions or requests for special assistance may also be directed to that office.



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The College of Veterinary Medicine

Cornell University College of Veterinary Medicine has a rich heritage and distinguished record in education, research and professional service. Established as the first contract (statutory) college at Cornell on March 21, 1894, the college honors its centennial this year by several planned programs, culminating in a series of special events and celebrations scheduled for March 19-22, 1994.

The history of the teaching of veterinary medicine at Cornell University predates the establishment of the College in 1894. Shortly after Cornell University was founded, Ezra Cornell insisted that a chair of veterinary medicine be instituted. Cornell's experience as an owner of purebred livestock had taught him the importance of animal health, and he instructed Andrew D. White, the university's first president, to seek the best-qualified person to teach courses in veterinary medicine and surgery. It was the first time that veterinary science had been granted equal rank with other sciences at an American university.

Dr. Law provided a course in veterinary medicine to a class of approximately 20 students during the academic year 1869-70. Two individuals from this group graduated with the Cornell degree of Bachelor of Veterinary Sciences. One of these was Daniel E. Salmon, who returned for additional study and received the first Doctor of Veterinary Medicine degree to be awarded in the United States in 1876.

A veterinary building was provided by the state at the time of the establishment of the New York State Veterinary College in 1894. When the college first opened for classes in the fall of 1896, there were six professors, two instructors and eleven students. The scholastic requirements for entrance was a high school diploma, a high standard at the time.

The early faculty recognized the importance of a good library and set this goal as one of their priorities. Governor Roswell P. Flower made a personal donation in 1897 to the library that now bears his name and houses an impressive collection of veterinary and biomedical resource materials.

Women have played an important role in the college since its early days. Florence Kimball, the first woman to receive the D.V.M. degree in the United States, graduated from Cornell in 1910. Seven of the first eleven women to become licensed veterinarians in this country were Cornell graduates.

The college remained at its original site at the southeast corner of East Avenue and Tower Road until 1957, when it moved to the present site at the east end of Tower Road. The main group of buildings occupies about 20 acres. Several additional facilities are nearby, including the James A. Baker Institute for Animal Health and the P. Philip Levine Laboratory, both located on Snyder Hill.

The ten story Veterinary Research Tower was added in 1974 and the Diagnostic Laboratory in 1978. A major expansion of the college facilities is currently underway. The Veterinary Education Center, consisting of expanded lecture, teaching laboratory and library facilities was completed in summer 1993. The Veterinary Medical Center, which will contain a new Veterinary Medical Teaching Hospital and greatly expanded office and research space, is scheduled for occupancy in 1995.

Over 900 faculty and staff members work together to provide teaching, research and professional service programs which are recognized as among the best in the world. Approximately 320 women and men are enrolled in the four year professional education program leading to the Doctor of Veterinary Medicine degree. The curriculum has been modified for students arriving in the fall of 1993, making it more flexible and providing greater opportunities for students to learn in an active educational environment. Approximately 100 graduate students are enrolled in Ph.D. or M.S. degree programs in the graduate Fields of Veterinary Medicine, Physiology, Immunology, Toxicology and others. Internship and residency programs in the Veterinary Medical Teaching Hospital and the Departments of Clinical Sciences and Pathology enroll approximately 30 individuals seeking advanced work in various clinical specialties.

Admission to the D.V.M. Program

The College welcomes applications from energetic, academically talented, and highly-motivated individuals with diverse backgrounds. Eighty students are admitted each year: approximately 60 New York residents, 8 from contracting states (New Hampshire, New Jersey, and Puerto Rico), and the remainder from any country or state in the U.S.

Academic Preparation

Prospective applicants should complete a minimum of 90 semester credits, preferably at an undergraduate institution with a reputation for academic excellence that offers the prerequisite courses as part of an accredited baccalaureate program. For those who find it necessary to complete some coursework at a two-year college, at least 30 of the 90 credits must be completed at the upper division level in a four-year baccalaureate program.

The following college level course requirements are prerequisites for admission and must be taken for a grade (not pass/fail or credit only):

If Advanced Placement credit has been received for a basic course, it is expected that a more advanced course in the same subject will be listed with a grade in fulfillment of the requirement.

Selection Criteria

Academic Achievement and Aptitude

Veterinary medical education requires strong academic abilities, therefore, 65 percent of the total admissions evaluation is given for academic achievement and aptitude. Cumulative grade point average (GPA) is weighted 30 percent. Grades are considered reliable indicators of academic motivation and aptitude. A minimum 3.0 (on a 4.0 scale) is expected. The average GPA for recently admitted classes has been approximately 3.5. Scores on the general tests of the Graduate Record Examination (GRE) are also allocated 30 percent of the total admissions score. The advanced biology test or other advanced tests are not required. The GRE must be

taken no later than October of the year of application. Scores from GRE tests taken more than five years before the application deadline will not be considered. The GRE is administered by the Educational Testing Service, P.O. Box 6000, Princeton, New Jersey 08541-6000 (telephone 609/771-7670 for the Princeton office or 510/654-1200 for the California office). Results of the examination will be reported to the College if the institution code R2549 is properly entered on the test forms. A bonus of up to 5 percent may be awarded by the Admissions Committee for quality of academic program. Factors considered in giving this bonus are: enrolling in a challenging curriculum, carrying a full course load to completion, and exceeding minimum pre-veterinary course requirements.

All prerequisite courses must be completed with at least a grade of C. It is possible to have up to seven credits in progress at the time of application, provided that at least one semester of any two-semester series has been completed. All requirements must be completed by the end of spring term of the year of intended matriculation. The Admissions Committee reserves the right to review the content of courses submitted in fulfillment of these requirements to ensure an adequate, current knowledge base. Official transcripts documenting completion of courses is sent directly to the Admissions Office from all colleges and universities attended.

Experience Working with Animals and with the Veterinary Profession

An understanding of the veterinary medical profession and of proper animal care are important considerations and are valued at 20

	<i>Minimum Semester Credits</i>	<i>Minimum Quarter Credits</i>
English composition ¹	6	9
Biology (full year with laboratory)	6	9
Inorganic (General) Chemistry (full year with laboratory)	6	9
Organic chemistry ² (full year with laboratory)	6	9
Biochemistry (upper division) ³	4	6
Physics (full year with laboratory)	6	9
General microbiology (with laboratory)	3	4.5

¹ One-half of this requirement may be satisfied with an oral communication course.

² Chemistry 251 and 253 will satisfy this requirement at Cornell University.

³ This should be a complete course in general biochemistry; half of a two-term sequence does not constitute a complete course.

percent in the selection process. This experience can be gained by working in a veterinary practice or by breeding, rearing, feeding, and showing various kinds of animals, including companion animals, livestock, laboratory animals, zoo animals, or wildlife. The quality and quantity of this experience is evaluated on the basis of the applicant's description and by letters of evaluation from supervisors.

Other Achievements and Character

The well-rounded candidate demonstrates achievement outside of academic and animal-oriented activities. The Committee values community involvement and any significant non-academic interests and abilities, as well as desirable personality characteristics such as reliability, honesty, good communication skills, and dedication to service. The evaluations and essay which accompany the application serve as indicators of these factors. These factors account for another 15 percent of the evaluation.

Guaranteed Admission Program

Highly qualified students may apply in the spring of their sophomore year for early admission to the D.V.M. professional program. Their outstanding academic qualifications can guarantee them admission at the completion of their junior year or, if they choose, after graduation with a baccalaureate degree. With their professional education assured, they are free to plan an undergraduate curriculum that broadens their general education or focuses on a specialized interest. Application and requirements for guaranteed admission are the same as for other applicants, except that candidates for guaranteed admission must have grades of B or better in all prerequisite courses. Students who have not completed all the required courses must complete them by the end of the spring term prior to matriculation in the professional curriculum.

The latest acceptable GRE test date for guaranteed admission is the February test of the year of application. Completed applications for guaranteed admission must be sent to the Admissions Office with a postmark no later than April 1.

Application Procedures

Application forms and detailed information may be obtained by writing to the Admissions Coordinator, Office of Student Services. Application materials will be ready for distribution August through October annually. The complete application material, application fee, and supporting documents must be submitted to the admissions office by November 1.

University Requirements

Applicants accepted for admission are required to pay a registration fee and will be notified of the amount and due date at the time of acceptance. No refunds will be made to applicants who withdraw after due date of the fee. Entering students must also fulfill the health requirements adopted by the Board of Trustees of Cornell University.

Applications from Foreign Students

International students may compete for non-resident positions. In addition to fulfilling all other requirements, foreign students must have completed at least one year of undergraduate studies at an accredited college or university in the U.S. in order to be eligible.

Reapplication

Previous applicants who would like to reapply should submit a new application, together with application fee, and any new information necessary to update the record. Application files are retained by the College for two years. Re-applicants may request that documents from prior applications within two years be reconsidered in the current application.

Combined Programs

Double Registration: Through a program of double registration, it is possible for D.V.M. students who completed their pre-veterinary work in the College of Agriculture and Life Sciences at Cornell University, and who were accepted after their third year of undergraduate study, to complete a B.S. degree while working on the D.V.M. degree. Students interested in this program should consult their undergraduate faculty advisors.

D.V.M./Ph.D. Programs: Veterinary students aspiring to academic or research careers may apply for the combined D.V.M./Ph.D. program. Details of this program are provided in the section on the Graduate School.

Dates to Remember

August 15: Applications available.

October: Latest GRE test date for regular admission.

November 1: All application materials must be either postmarked or carried to the Admissions Office together with \$60 application fee (a certified bank check or money order in U.S. funds).

March: Notification of acceptance or denial. Information Sessions held at the College.

April 1: Due date for Guaranteed Admission applications.

April 15: All U.S. Colleges of Veterinary Medicine have agreed that April 15 is the final date for applicants offered admission to either accept or decline.

June: Notification to Guaranteed Admission applicants.

August: Registration and orientation. Classes begin.

For more information or an application packet, please contact the Admissions Coordinator, Office of Student Services.

The D.V.M. Curriculum

Class of 1997

The College of Veterinary Medicine at Cornell University introduces a new veterinary medical curriculum this year. It represents the culmination of six years of intense strategic planning, self study, and meticulous development by our faculty. The curriculum is comprised of two types of courses. Foundation courses, constituting 70 percent of the curriculum, are scheduled throughout all four years of study and are taken by all students in the same sequence. These are integrated, interdisciplinary courses which emphasize a comparative approach to basic biomedical sciences and the fundamentals of clinical medicine. Foundation courses are complemented by distribution courses from which students may select individual courses which fulfill a specific educational need or area of interest.

Classes of 1994-96

The traditional Doctor of Veterinary Medicine academic program remains in effect for the Classes of 1994, 1995, and 1996. It is organized in a core-selective format with approximately 90 percent comprised of required core courses. In addition, students are required to satisfactorily complete a minimum of 14 Selective credits (two credits in year one and four credits in each of years two, three, and four).

Emphasis during the first two years of this curriculum is on the basic science subjects central to veterinary medicine and the biomedical sciences. The typical instructional format is a combination of lecture and associated laboratories. Subjects taught in the third year are primarily related to the clinical sciences.

Some courses, for example, Surgical Exercises and Theriogenology, include applied laboratories where students have the opportunity to develop technical skills in clinical disciplines. Rotations in the various clinical services of the Veterinary Medical Teaching Hospital form the basis for the fourth-year curriculum. Selective courses in year four include the opportunity to participate in external clinical rotations, such as hospitals at other academic institutions, specialized private practices, and zoological facilities.

Requirements for Graduation

To receive the doctor of veterinary medicine (D.V.M.) degree, candidates must successfully complete the curricular requirements as listed, pay all fees due, and be recommended for graduation by the faculty of the College of Veterinary Medicine.

The academic year, divided into two terms, begins in late August and ends in late May. At the conclusion of each term, the college faculty reviews the records and conduct of students. Students whose grades are not satisfactory may be denied permission to register in the subsequent term or to graduate or may be assigned varying degrees of academic warning or probation.

Use of Animals in the Curriculum

Applicants for the D.V.M. program should know and understand the following criteria relative to the use of animals in the D.V.M. teaching program, as passed by the faculty in 1988.

1. Live animals will be used for teaching in certain obligatory core [and foundation] courses.

2. Some of the animals will require humane euthanasia after they have been used for teaching.

3. The college conforms to the rules for the care of such animals as outlined in *Guiding Principles in the Care and Use of Animals*, as approved by the Council of the American Physiological Society, and the *Guide for the Care and Use of Laboratory Animals*, DHEW publication number 86-23 (revised 1985).

4. Each course in which animals are used receives a formal review annually by the college Committee on the Use of Live Animals in Teaching.

5. Any concerns regarding the use of live animals in teaching should be addressed first to the faculty member responsible for that course. Alternatively, students may choose to address their concerns to the chair of the Committee on the Use of Live Animals in Teaching, whose name may be obtained from the Office of Student Services or from the dean's office. The chair may initiate discussion between the said committee and the faculty member responsible for a particular course without involving the student if he or she would prefer to remain anonymous.

Applicants must acknowledge having read the above information by signing the application form in the designated place.

Summary of D.V.M. Program (Class of 1997)

First Year

<i>Fall Term</i>	<i>Credits</i>	<i>Spring Term</i>	<i>Credits</i>
<i>August 26 - November 11, 1993</i>		<i>January 10 - January 26, 1994</i>	
VIMED 510 The Animal Body	1 2	VIMED 520 Genetics and Development*	8
VIMED 517 Animals, Veterinarians, and Society: Part A	1	VIMED 527 Animals, Veterinarians, and Society: Part B*	1
<i>November 12 - December 17, 1993</i>		<i>January 27 - March 18, 1994</i>	
VIMED 520 Genetics and Development*	-	VEIA 504 Neuroanatomy and Clinical Neurology	3
VIMED 527 Animals, Veterinarians, and Society: Part B*	-	Distribution Courses**	7
	<hr/> 1 3	<i>March 28 - May 20, 1994</i>	
		VIMED 530 Function and Dysfunction: Part I	9
		VIMED 537 Animals, Veterinarians, and Society: Part C1	1
			<hr/> 2 9

Second Year (Courses not offered until 1994-95)

<i>Fall Term</i>	<i>Credits</i>	<i>Spring Term***</i>	<i>Credits</i>
<i>Weeks 1 - 4 6</i>		<i>Weeks 1 - 8</i>	
VIMED 531 Function and Dysfunction: Part II	7	VIMED 550 Animal Health and Disease	1 0
VIMED 538 Animals, Veterinarians, and Society: Part C2	1	VIMED 557 Animals, Veterinarians, and Society: Part E	1
<i>Weeks 12 7 - 16</i>		<i>Weeks 9 - 16</i>	
VIMED 540 Host, Agent and Defense	1 2	Distribution Courses**	1 0
VIMED 547 Animals, Veterinarians, and Society: Part D	1		<hr/> 2 1
	<hr/> 2 1		

Third Year

<i>Fall Term***</i>	<i>Credits</i>
VIMED 551 Animal Health and Disease	2 0
VIMED 558 Animals, Veterinarians, and Society: Part E	2
	<hr/> 2 2

Third Year (spring) & Fourth Year (summer, fall, and spring)***

	<i>Credits</i>
Applied Clinical Education	to be determined
Distribution Courses	to be determined

*Begins in the fall term and concludes in the spring term.

**Number of credits recommended.

***Courses and credits pending approval by faculty.

Summary of D.V.M. Program (Classes of 1994, 1995, 1996)

Second Year

<i>Fall Term</i>	<i>Credits</i>	<i>Spring Term</i>	<i>Credits</i>
VEIMI 510 Veterinary Parasitology	4	VEIMI 518 Infectious Diseases III	2
VEIMI 516 Infectious Diseases I	4	VEIPR 529 Pharmacology II	2
VEIMI 517 Infectious Diseases II	2	VEIPA 536 Veterinary Pathology II	4.5
VEIPR 528 Pharmacology I	4	VEICS 561 Theriogenology I	3
VEIPA 535 Veterinary Pathology I	4	VEIPA 571 Clinical Pathology	3
VEICS 545 Epidemiology	2	VEICS 579 General Medicine and Surgery	4
	<hr/> 20		<hr/> 18.5

Selectives (to be taken either fall or spring) 4

Third Year

<i>Fall Term</i>	<i>Credits</i>	<i>Spring Term</i>	<i>Credits</i>
VEIA 505 Applied Anatomy	1	VEIA 506 Applied Anatomy	1
VEICS 548 Anesthesiology	1	VEICS 520 Preventive Medicine in Animal Health Management	1
VEIAV 555 Avian Diseases	2	VEIDL 531 Regulatory Medicine	Req.*
VEICS 562 Theriogenology II	3	VEIPA 539 Laboratory Animal Medicine	1
VEICS 563 Large Animal Medicine and Surgery	5	VEICS 564 Large Animal Medicine and Surgery	6
VEICS 566 Radiographic Techniques	1	VEICS 582 Large Animal Surgical Exercises	2
VEICS 567 Clinical Nutrition	2	VEICS 584 Small Animal Medicine and Surgery	7
VEICS 583 Small Animal Medicine and Surgery	5	VEICS 586 Small Animal Surgical Exercises	2
	<hr/> 20		<hr/> 20

Selectives (to be taken either fall or spring) 4

Fourth Year**

<i>Required</i>	<i>Credits</i>	<i>Required</i>	<i>Credits</i>
VEIPA 540 Pathology Service	2	VEICS 594 Large Animal Medicine Service	3
VEICS 572 Senior Seminar	1	VEICS 598 Dermatology Service	2
VEICS 574 Large Animal Surgery Service	4		<hr/> 33
VEICS 575 Ambulatory Service	4		
VEICS 578 Clinical Anesthesiology	3	Selectives***	
VEICS 580 Radiology Service	2	VEICS 547 Practice Management	2
VEICS 589 Small Animal Medicine and Community Practice Services	6	VEIPA 549 Laboratory Animal Clinical Rotation	2
VEICS 591 Small Animal Surgery Service	4	VEICS 570 Theriogenology Service	2-4
VEICS 593 Ophthalmology Service	2	VEICS 596 Opportunities in Veterinary Medicine	variable

*This course (or its equivalent) is required, but no formal credit is awarded.

**The academic calendar for senior students includes the summer months following the junior (third) year. Fourth-year clinical rotations and Selective courses are scheduled over a twelve-month period (May to May), rather than being restricted to the fall and winter semesters.

***An employment or vacation period is available at varying times during the year, depending on the individual's schedule. A minimum of 4 additional credits must be completed. These may be obtained either by repeating 2 or 4 credits (weeks) of the regular hospital rotations or by choosing from the selective courses listed.

Academic Policies and Procedures

Registration and Validation

At registration, the university registrar and colleges certify the eligibility of each student to enroll in courses and to purchase or use a variety of services available at the university, such as CornellCard, Co-op dining, libraries, campus bus passes, and housing. The university registration process also includes the issuance and validation of the student identification card and the collection of information for the student directory and for state and federal reports.

Registration is accomplished when the student, in a timely manner, fulfills financial obligations to the university, meets the college's standards for continued course enrollment, and complies with health requirements as set forth by University Health Services.

Registration is complete when both the university and the college have recorded that the student is on campus.

Identification card validation is held at the College of Veterinary Medicine on one of the registration dates stated in the academic calendar. The specific date, time, and place are announced well in advance of the beginning of each term.

Late university registration begins the first day of classes. Students who have not cleared their financial obligations to the university, course problems with the college, or health requirements with Health Services before the first day of classes are considered late and are charged a penalty fee for late registration. The university registrar establishes the final registration date, usually the end of the third week of classes. Unregistered persons may not attend classes. The university reserves the right to require unauthorized unregistered persons who attend classes or in other ways seek to exercise student privileges to leave the university premises.

Graduation Requirements

Each student is responsible for knowing the requirements (core and selective, or foundation and distribution) for completion of the D.V.M. program, and for properly enrolling in and completing the appropriate courses each term. Requirements for each year of the program are outlined in *The D.V.M. Curriculum* section of this catalog.

Course Enrollment

Course enrollment at the College of Veterinary Medicine is accomplished as follows:

Core/Foundation Courses: The college registrar's staff automatically enrolls each student in required courses.

Selective/Distribution

Courses: Prior to the start of each term, the list of courses to be offered and the Selective/Distribution Course Enrollment Form are distributed by the Office of the College Registrar. After choosing selective/distribution courses, each student completes the enrollment form according to the accompanying instructions. Completed enrollment forms should be submitted to the college registrar as soon as possible and may not be turned in later than noon on the date of the end of the open add/drop period, which is stated on the form.

Following the add/drop period, each student is sent a course enrollment schedule which should include all (core/foundation and selective/distribution) courses in which the student is enrolled. It is the student's responsibility to examine this schedule and report any errors to the Office of the College Registrar immediately.

Changes to Course Enrollment (Add/Drop Policy)

Selective courses may be added or dropped without penalty during the first three weeks of the term.

Distribution courses may be added or dropped during the first week of the term. Credit will not be awarded for a course in which the student was not officially enrolled, even if the student attended all classes and completed the work. This is a Cornell University policy which may not be waived by the College. Selective courses may be dropped from the fourth through the sixth week of the term, for a late fee of \$15 per course.

The College course enrollment is reported to various university, state, and federal offices at the end of the sixth week, after which no further changes may be made.

Changes to fourth-year rotation schedules, whether they affect required, required elective, or extra clinical rotations, are subject to the college add/drop policy outlined above, and also to the stipulation by the Veterinary Medical Teaching Hospital that no change may be made less than four full weeks prior to the first rotation affected by the change.

Auditing Courses

The university does not allow veterinary students to audit courses.

Leave of Absence and Withdrawal

Requests for leave of absence and notification of intention to withdraw should be submitted, in writing, to the assistant dean for student services. A leave of absence is granted for a specified time, after which the student is expected to resume course work. The assistant dean's written authorization of the leave will specify a date by which the student on leave must notify the college of intent to resume studies. A student may withdraw at his or her discretion. However, a college may withdraw a student who fails to return at the end of a period of authorized leave or who fails to provide notice of intent to return by the specified date.

Medical leaves are granted and processed through University Health Services, but any student taking medical leave should consult the assistant dean for student services concerning arrangements to resume studies in the college.

Tuition Refunds and Financial Aid Adjustment

Amounts personally paid for tuition may be refunded if the student requests a leave of absence or withdrawal from the assistant dean for student services. The date of this request will determine the tuition liability for the term. Students who terminate their registration with the university in this manner during any term will be charged tuition from the university registration day through the date of their request on a pro rata basis. Contact the Office of the Bursar, Cornell University, 260 day Hall, Ithaca, New York 14853 (telephone: 607-255-2336) for details.

The university makes available tuition insurance, which provides refunds in the event of leave of absence or withdrawal for medical or emotional reasons. Applications and complete details of this coverage accompany the August tuition bill.

The application fee for university residence halls is nonrefundable, except when lack of space prevents the offer of a room assignment, in which case a full refund will be made on request.

Students who withdraw from a prepaid dining plan during a term are eligible for a prorated refund based on the number of days the contract was in effect.

Financial Aid Repayment

Students receiving financial aid through the university who withdraw during a term will have their aid reevaluated, possibly necessitating repayment of a portion of aid received. Repayment to aid accounts depends on the type of aid received, government regulations, and the period of time in attendance. A partial term will generally count as one of the eight terms of financial aid eligibility normally allowed a student.

Grading Guidelines and Academic Standards

Grading Guidelines for the Classes of 1994-96

The official university grading system uses letter grades with pluses and minuses. Passing grades range from A+ to D-; F is failing. INC denotes a grade of incomplete. It is the student's responsibility to see that all incomplete grades are made up within the deadline set by the college faculty and that the grade has been properly recorded with the college registrar.

R is the grade given at the end of the first term of a year-long course. It is the responsibility of the student to re-enroll in the following term in any course for which a grade of R is received.

Quality-point equivalents for A+ to F grades are:

A+ = 4.3	C+ = 2.3
A = 4.0	C = 2.0
A- = 3.7	C- = 1.7
B+ = 3.3	D+ = 1.3
B = 3.0	D = 1.0
B- = 2.7	D- = 0.7
	F = 0.0

The grades of INC and R do not have quality points attached. A grade may be changed only if the instructor made an error in calculating the original grade.

College faculty have agreed to the following policies regarding grades: For a given examination, the student may select one of two grading options, the numerical grading option or the S, W, U grading option. The student will select the option by checking a box on the front of the paper or by another similar device.

The numerical grading option: Grades will be given using an actual number or percentage.

Exams will be corrected and returned with errors and omissions noted, with numerical points indicated where appropriate.

The S, W, U option: All grades given on the examinations will be reported to the student as Satisfactory, Warning, or Unsatisfactory, with Satisfactory = C- and above, Warning = D-, D, D+, and Unsatisfactory = F. Errors and omissions by students are to be indicated on the examinations, but the numerical or letter grade (A+ - F) is not to be written on the paper.

For either option, steps will be taken to ensure the complete confidentiality of the individual student's work and results.

Teachers report official grades (A+ - F or S-U) to the Registrar's Office.

Fall final grades will be distributed in student mailboxes about the third week of January. Spring final term grades will be mailed directly to home (permanent) addresses, unless a summer address has been provided to the College Registrar's Office.

Advisors will be furnished with students' course grades as S, W, or U unless the official grades recorded are specifically requested from the Office of Student Services by the advisor. Class Teachers Committees will be given the course grades (A+ through F) and cumulative averages.

Grading Guidelines for the New Academic Program (Class of 1997)

Students will be evaluated at the end of each Foundation and Distribution course and will be awarded a whole letter grade A-F (A, B, C, D or F). The grade will represent the composite of the grades from each component of the evaluation process, as determined by the course leader. Course faculty have the prerogative not to use the full range of the grading scale depending on the course objectives, course content and the nature of assessment methods used. Quality-point equivalents for A to F grades are listed previously.

For each course, students may select to be notified of their grades by the faculty member responsible for the course by using one of two grading options, the letter grading option (A, B, C, D or F) or the S/U grading option. If the S/U option is selected, the instructor will still assign a letter grade (A, B, C, D, or F) to be recorded on the transcript.

The Letter Grade Reporting

Option: Letter grades (A, B, C, D or F) will be provided to the student. Examinations will be corrected and returned with errors and omissions noted.

The S/U Grade Reporting

Option: All grades will be reported to the student as Satisfactory or Unsatisfactory; with Satisfactory = C and above, and Unsatisfactory = D or F. On the examinations, errors and omissions by students will be indicated, but the letter grade (A, B, C, D or F) will not be reported to the student. Letter grades will, however, appear on transcripts and official grade reports provided by the University.

For either option, steps will be taken to ensure the complete confidentiality of individual students' work and results.

Academic Standards for the New Academic Program

Foundation Courses: A student who achieves a grade of F in two Foundation courses, or a grade of D in three Foundation courses, will not be allowed to reregister in the College of Veterinary Medicine. A student who achieves a grade of F in one Foundation course, or a grade of D in two Foundation courses in any one semester, will be denied permission to advance to the subsequent term; however, the student will be permitted to repeat the term in which the above grade(s) was(were) achieved. A student who achieves a grade of D in one Foundation course shall be placed on *academic warning* and will be required to attain a grade point average of 2.0 or above in Foundation courses taken the following semester. A student who does not achieve this required grade point average shall be denied permission to advance to the subsequent term; however, the student will be permitted to repeat the semester.

Distribution Courses:

Whereas the College Faculty has not instituted minimum yearly credit requirements for Distribution courses, receiving a grade of D or F for individual Distribution courses will not, by itself, constitute grounds for denial to advance to the subsequent semester. However, only courses for which a passing grade (D or above) is achieved will count towards the minimum credit requirement for graduation or towards fulfilling minimum requirements for Distribution courses from required sets. Furthermore, no more than four Distribution courses with D grades will count towards the minimum credit requirements for graduation.

Repeating a Semester: A student who has been denied permission to advance may only repeat once. A student who repeats a term will be required to take all Foundation courses normally offered during that term, unless exempted by the faculty responsible for teaching the course.

These Academic Standards do not compromise the prerogative of the College Faculty which may, under exceptional circumstances, make exception to these standards.

Transcripts

Transcripts may be obtained only through the Office of the University Registrar, 222 Day Hall. An official transcript is one that bears the official seal of the university and the signature of the university registrar, sent in a sealed envelope directly from the Office of the University Registrar to another institution or agency as directed by the student. A fee is charged for each official transcript. A student may also request that an unofficial transcript be sent to a particular office on campus. There is no fee for this service. Transcript Request Forms may be picked up in the Office of Student Services.

Student Records

Under the Family Educational Rights and Privacy Act of 1974 (FERPA), students must be advised of their rights concerning their education records. Education records include records directly related to a student and maintained by an educational institution or party acting on its behalf. The law gives students the right to: inspect and review their education records; challenge contents of education records; a hearing if the challenge is unsatisfactory; include an explanatory statement in the education records if the outcome of the hearing is unsatisfactory; prevent disclosure of personally identifiable information;¹ secure a copy of the institutional policy which includes the location of all education records;² and file complaints with the Department of Education concerning institutional failure to comply with the act.

¹Directory information is a category of personally identifiable information that includes name, home address, local address, local telephone listing, dates of attendance at Cornell, major field of study and college attended, previous educational agency or institution attended, participation in officially recognized activities, degrees earned and awards received. Directory information may be released unless the student indicated otherwise at the time of registration. Students who wish no release of their directory information must inform the Office of the University Registrar in writing within 10 days of the date of official university registration each academic year. Students may rescind their no release request at any time in writing to the Office of the University Registrar.

²Copies of the "Cornell University Policy on Access to and Release of Student Education Records" are available at the Office of the University Registrar, 222 Day Hall.

Finances

Tuition and Fees

Tuition and fees for doctor of veterinary medicine degree candidates are \$11,550 for New York State residents and \$15,000 for nonresidents for the 1993-94 academic year. Most students in the college do not live in university housing. The cost of room and board in Ithaca for 1993-94 is estimated at \$6,150. Required books, instruments, and supplies cost approximately \$725 a year. An additional allowance of \$3,570 should cover student health insurance (estimated at about \$500), clothing, laundry, local transportation (including approximately \$218 for a parking permit), telephone and incidentals. These estimates are based on standard budget figures provided by the university's Office of Financial Aid and Student Employment for the purpose of allocating funds and budgeting for financial aid. Individual expenditures may exceed these figures, depending on personal preferences. The university may change the amount, time, and manner of payment of tuition, fees, or other charges at any time without notice.

Students who wish to pay tuition in monthly installments should contact the Office of the Bursar. Information about this plan is mailed to continuing students in April of each year and to incoming students in May of each year.

Courses of Study provides further information about university policies, student services, fee schedules, and payment procedures.

Financial Aid

Information and guidance regarding financial aid for veterinary students is available through the college Office of Financial Aid.

Details of the methods, procedures, calendar, resources, and policies are provided in the college publication *Financial Aid Handbook: A Guide to Student Financial Aid at the College of Veterinary Medicine at Cornell University*, which is updated and distributed to students annually. Approximately 85 percent of financial aid available for the 1993-94 academic year will be through loans and other forms of self-help. College grant and scholarship monies permit modest awards of gift aid to about 25 percent of each class. Such awards are usually based on student/family need. Some scholarships, such as the SUNY

Underrepresented Graduate Minority Fellowship, stipulate additional eligibility criteria. In recent years, eligible minority students have received awards ranging from \$5,000 to \$11,000 per year, depending on documented need. The college's policy of support is based on the assumption that parents and spouses are willing to help finance the education of their family members to the extent possible.

Application for Financial Aid

The required materials for determination of eligibility for student loans and employment subsidy include the *Free Application for Federal Student Assistance* (FAFSA), and copies of student/spouse federal tax returns, including any supplemental schedules filed. To standardize procedures and provide uniform criteria for estimating family financial strength for the purposes of allo-

cating gift aid, the college uses the Graduate and Professional School Financial Aid Service (GAPSFAS) financial statement, and copies of student/spouse/parent tax returns and supplemental schedules. Application materials and instructions are available from the college Office of Financial Aid early in January and should be submitted to the appropriate processor (U.S. Department of Education or designated service agency and GAPSFAS) by March 1 for aid beginning the following term. The college Office of Financial Aid conducts individual need analyses, and available aid is recommended accordingly. Financial aid packages offered by the college may combine loans, employment, and gift aid. Application for financial aid does not affect the admissions evaluation process. Residents of New York State should apply each year to the New York State Higher Education Services Corporation for determination of eligibility for Tuition Assistance Program (TAP) awards. Applications forms are usually available at the college early in March and should be submitted by early summer.

Loan Sources

Students enrolled in the College of Veterinary Medicine may qualify for long-term educational loans through one or more of the following loan programs authorized and regulated by the federal government: Federal Stafford Loan Program, Federal Perkins Loan Program, Health Professions Loan Program, Unsubsidized Federal Stafford Loan Program, Federal Supplemental Loans for Students, and Health Education Assistance Loan Program.

	<i>FSL*</i>	<i>FPL**</i>	<i>HPSL**</i>	<i>UFSL*</i>	<i>FSLs*</i>	<i>HEAL</i>
Annual Maximum	\$8,500	\$5,000	Tuition + \$2,500	\$8,500	\$10,000	Unmet Need
Aggregate Maximum	\$65,000	\$30,000	None	\$65,000	\$73,000	None
Interest Rate	T-Bill +3.1% Max 9%	5 %	5 %	T-Bill +3.1% Max 9%	T-Bill +3.1% Max 11%	T-Bill +3.25% No Max
Eligibility Evaluation	FAFSA, no parental data	FAFSA, no parental data	FAFSA <u>and</u> GAPSFA <u>with</u> parental data	FAFSA, no parental data	FAFSA, no parental data	FAFSA, no parental data
In-School Repayment	None	None	None	Interest, OR may capitalize	Interest, OR may capitalize	Interest, OR may capitalize
Origination Fee	5 %	None	None	5 %	5 %	None
Insurance Premium Fee	up to 3%	None	None	Up to 3%	up to 3%	6-8%
Grace Period	6 months	6 months	1 year	If have FSL, 6 months, principal only	None	9 months
Minimum Monthly Repayment	\$50	\$40	\$15	May be graduated	May be graduated	May be graduated
Maximum Years to Repay	10	10	10	10	10	25
Deferments (see below)	1,2,3,4	1,2,3,4,7,8	5,6,9	1,2,3,4	1,2,10	5,6

Deferments	<ol style="list-style-type: none"> 1. At least half-time attendance 2. Limited period of unemployment 3. Limited period of economic hardship 4. Graduate or post-graduate fellowship-supported study outside U.S. 5. Limited period of military service 6. National service volunteer 7. Approved rehabilitation programs for disabled individuals 8. Approved periods of community service activity 9. Advanced professional training 10. Limited period of temporary disability 11. Full-time graduate study within U.S.
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* Student obtains loan application form from lender of choice and submits to College Financial Aid Office for certification of eligibility to borrow. Students with outstanding loan balances on prior loans from these sources must apply through the same lender, unless the loans have been sold, in which case the student may choose a new lender.

** Lender is Cornell University. Loan promissory notes for signature will be distributed through the College.

***For 1993-94, two applications will be needed to obtain the full \$8,500 available.

Repayment of these loans is guaranteed by the federal government in the event of the borrower's death or total disability prior to retirement of the debt.

NOTE: ALWAYS READ ALL LOAN DOCUMENTS, APPLICATIONS AND PROMISSORY NOTES, BEFORE SIGNING. EACH SET OF LOAN DOCUMENTS PROVIDES THE TERMS AND CONDITIONS OF THAT LOAN. It is important to remember that regulations governing any given loan program are subject to change at anytime and that levels of funding and loan terms for various programs may vary from year to year.

Repayment of principal on the Health Professions, Federal Perkins, and Federal Stafford loans is totally deferred while the student is enrolled at least half time in an eligible educational program. Interest on Unsubsidized Federal Stafford, Health Education Assistance Loan, and Federal Supplemental Loan for Students accrues from the date of disbursement. Interest rates vary according to the source of the loan. The table above summarizes the terms of these loan programs.

Short-term Emergency Loans

The College of Veterinary Medicine also provides short-term, interest-free emergency loans to students whose aid payments for the current term have been delayed for reasons beyond the student's control. Funds for these loans come from the following sources: the Cornell Veterinary Alumni Association, the New York State Veterinary Medical Society, the family of David E. Wright '12, the National Association of Federal Veterinarians Emergency Loan Fund, the

Student Emergency Loan Fund of the Auxiliary to the New York State Veterinary Medical Society, and the Charles H. Webster Veterinary Fund.

The Auxiliary to the American Veterinary Medical Association (AVMA) also has limited loan monies available to third- and fourth-year veterinary students. Those are short-term loans which are not guaranteed by the government. Application is made directly to the Auxiliary to the AVMA.

Student Life

Housing and Dining

Off-Campus Housing

Most veterinary medical students live off campus. Students should plan to visit Ithaca well in advance of registration if they wish to obtain quarters off campus. Information on housing is available at the Off-Campus Housing Office, 1142 North Balch Hall. The college Office of Student Services also maintains lists of housing suitable for veterinary students.

On-Campus Housing

The graduate residences are conveniently situated and provide a comfortable multicultural atmosphere for study, recreation, and socializing. The new Maplewood Park apartments, near the College of Veterinary Medicine on the southeast side of campus, house 308 single graduate students and 90 student families. Schuyler House, located in a residential area within walking distance of campus and downtown shopping areas, accommodates 140 graduate men and women. Two small co-educational residences, 112 Edgemoor and The Oaks, are situated on the west side of campus and together house approximately 70 graduate students. Thurston Court, a small apartment building situated on the north side of Fall Creek Gorge, accommodates 21 students.

Room assignments are made in the order in which applications are received. The housing contract for Maplewood Park and Thurston Court apartments is for a 12-month period beginning August 15. In the other graduate residences, the contract period is for the academic year. Requests for information and applications should be directed to the Housing Assignment Office, 1142 North Balch Hall, Ithaca, New York, 14853-1401 (telephone: 607-255-5368).

Student Family Housing

The university maintains apartments for approximately 420 student families in three different complexes. Hasbrouck and Pleasant Grove apartments, located on the north side of campus, have one- and two-bedroom unfurnished apartments. The family units in Maplewood Park are furnished and have one bedroom and a study. Requests for further information and applications should be directed to the Student Family Housing Office, 1142 North Balch Hall, Cornell University, Ithaca, New York 14853-1401 (telephone: 607-255-5368).

Dining Services

Breakfast and lunch are available in the cafeteria in the Veterinary Research Tower. Vending machines are also located at various places throughout the college.

Those students who plan to live on campus may choose to participate in the Co-op dining program. Additional information on the various plans available may be obtained from Cornell Dining, 233 Day Hall (telephone: 607-255-8582).

The Big Red Barn, a dining and social center for graduate and professional students, is centrally located near Bailey Hall. For current hours and services, telephone 254-GRAD.

Activities and Organizations

SCAVMA

Student Chapter of the American Veterinary Medical Association, SCAVMA, is an organized body of veterinary students made up of students at Cornell and the other veterinary colleges. It is the only recognized voice of veterinary students to universities, to the

AVMA and state veterinary organizations and the state and federal governments.

SCAVMA sponsors many social and educational activities. SCAVMA is becoming increasingly more active in national and legislative roles. It sponsors many lectures throughout the year.

SCAVMA is managed entirely by students with the assistance of a faculty and administrative advisor. Representatives from each class are elected in the fall, and executive officers are elected in the spring. About 90 percent of all veterinary students at Cornell are members of SCAVMA. Members in good standing for both third and fourth year are eligible, upon graduation, to belong to the AVMA Insurance Trust and to receive a one year free membership in the AVMA.

Other Organizations

Student chapters of the following organizations are affiliated with a national organization of the same name. They usually have a charter and fee structure similar to the same organizations at other schools.

- AABP** American Association of Bovine Practitioners
- AAEP** American Association of Equine Practitioners
- AAFP** American Association of Feline Practitioners
- AAHA** American Animal Hospital Association
- AASRP** American Association of Small Ruminant Practitioners
- AAV** Association of Avian Veterinarians

The following organizations reflect special student interests and may or may not be related to a national organization.

Canine Club

MEVSA Multi Ethnic Veterinary Student Association

ROVS Research Oriented Veterinary Students

SCAVAR Student Chapter Association of Veterinarians for Animal Rights

Signalment Issues facing future veterinarians

Ultrasound Singing Group

VIDA Veterinarians Interested in Developing Areas

The Veterinary Players Theater Group

Wildlife Clinic

ZAWS Zoo and Wildlife Society

Students also are members of the following college committees:

Affirmative Action Committee

Faculty-Student Liaison Committee
Honor Board

International Advisory Committee

Student Curriculum Committee

Common Environment Committee

Open House

Each year, students at the college participate in the planning and presentation of Open House. On a Saturday in April the college is opened to several thousand members of the public and offers displays and exhibits, tours, films, and instruction on many aspects of veterinary medicine directed toward various age groups.

Honor Societies

There are three honor societies for which students of the College of Veterinary Medicine are eligible.

Phi Zeta: Founded in 1925 by the veterinary students at Cornell University, Phi Zeta strives for the constant advancement of the veterinary profession, higher educational requirements, and superior scholarship. The object of the society is to recognize and

promote scholarship and research pertaining to the welfare and diseases of animals.

Sigma Xi: Any student or research staff member is eligible for membership in Sigma Xi, the Scientific Research Society of North America. It is the responsibility of the Admission Committee of Sigma Xi to select for membership those individuals whose research aptitude or achievement deserves special recognition.

Phi Kappa Phi: The society of Phi Kappa Phi was founded in 1897 and soon became a national organization. Its primary objective is to recognize and encourage superior scholarship in all fields of study. Good character is essential for those elected to membership.

Fraternities

Alpha Psi and Omega Tau Sigma have houses in Ithaca. These veterinary fraternities are coeducational and encourage all students to join whether or not they live at the house.

Academic and Personal Counseling

Faculty advisors assist with questions concerning academic progress and career goals within the profession. In addition, the college Office of Student Services provides assistance in resolving academic problems and personal difficulties that affect students' achievement. Workshops to improve study and test-taking skills and time management are offered. Individual consultation regarding personal adjustment and stress management is also available through the Office of Student Services.

Health Services

The Department of University Health Services provides medical care for all full-time undergraduate and graduate students enrolled at Cornell University in Ithaca. Gannett Health Center, at 10 Central Avenue, is open 24 hours a day during the school year and is available for overnight care and urgent outpatient services outside of normal working hours. Normal hours are Monday through Friday from 8:30 a.m. to 11:30 a.m.; 1:00 P.M. to 4:30 p.m.; and Saturday from 8:30 a.m. to 12:00 noon during regular academic terms.

The center's medical staff, under the supervision of the medical director, consists of attending physicians and health associates from the university staff and consulting physicians and surgeons from the Ithaca area. All medical records are strictly confidential.

For a medical appointment, a student should call 255-6958 or go to the center. For an appointment with Psychological Services, a student should call 255-5208 or go to the offices at the center. A doctor is on call for urgent problems 24 hours a day (telephone: 255-5155).

General medical care, psychological services, gynecological care, and overnight and after-hours care are provided at Gannett Health Center without additional cost. There may be a charge for laboratory service, radiographs, physical therapy, limited consultations, allergy shots, drugs, and other services provided on-site. There is a fee for all services off-site. Students may call 255-4082 for additional information.

Student Accident and Sickness Insurance Plan

Cornell sponsors a health insurance plan underwritten by a private insurance company to supplement the services outlined above. This plan may be waived if the student has other health insurance or is willing to accept the financial risk of no insurance. The university plan does not cover preexisting conditions. Students are urged to consider carefully the comprehensive benefits available for a relatively modest fee before waiving the plan. The plan covers most services available at the center for which a fee may be charged. It also covers services not available on campus, such as hospital care and consultations. Further, it provides for expenses relating to illness or accidents outside Ithaca during the academic year and vacation periods. Families of students are eligible for coverage and must enroll annually. Information about this insurance may be obtained by calling 607-255-6363 or by visiting Gannett Health Center, where a representative of the insurance company has an office.

Health Care Plan for Student Spouses

The University Health Services provides health care for student spouses on a prepaid or fee-for-service basis. The fee schedule and other information about this service are available at the front desk and in the Student Insurance Office.

Emergency Health Service

Students requiring after-hours or urgent care should call the health center at 255-5155 to receive instructions on the proper course of action to follow.

Conduct of Students

The standards of conduct expected of a Cornell University veterinary student are defined by various university regulations and by the College of Veterinary Medicine Student Honor Code. The code was established in recognition of the importance of ethics, honor, and integrity in an individual's training for the profession. It places the responsibility for ethical and professional conduct on the students and is implemented by the Student Administrative Board, which is granted initial jurisdiction by the faculty. It is each student's responsibility to become familiar with the contents of the code and to abide by it throughout his or her involvement with the college.

Placement

The placement service, a part of the Office of Student Services, C-106 Schurman Hall, offers valuable information to students attending the College of Veterinary Medicine at Cornell. Alumni and other practitioners seeking associates also benefit from this service.

Employment opportunities for permanent positions, summer jobs, and externships, solicited from all over the country, are stored on a central computer and accessed by remote terminal. Type of practice (small, large, or mixed) and desired geographic location can be selected and viewed on the screen or printed on a remote printer in the student services office.

Workshops on writing résumés, job applications, salary negotiation, and the purchase of insurance; compilation of national and state board information; and the collection and distribution of employment statistics are additional services provided by the Office of Student Services.

Services for Persons with Disabilities

Cornell University is committed to assisting those persons with disabilities who have special needs. A brochure describing services for persons with disabilities may be obtained by writing to the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801. Other questions or requests for special assistance may also be directed to that office.

Legal Requirements to Practice

Before graduates can practice veterinary medicine in the United States, they must obtain a license from the state or states in which they locate their practices. This license is generally issued by the department of education or the department of agriculture of the state on the basis of an examination by a veterinary licensing board. Some states issue licenses without examination, based upon reciprocity, when the applicant has been licensed in other states.

The licensing agency in New York is the State Education Department. Application for the examination must be filed at least 60 days before the scheduled date. Information about fees and all inquiries should be addressed to the Executive Secretary of the State Board for Veterinary Medicine, Room 3041, Cultural Education Center, Albany, New York 12230.

Special Programs

D.V.M. Students

International Grants Projects

The International Advisory Committee makes funds available on a competitive basis to D.V.M. students who are interested in becoming involved in veterinary projects in developing countries. All D.V.M. students in good academic standing are eligible to apply. Proposals for international projects must include a description of the project, personal background, interest in work overseas, language ability, a realistic budget, and plans for sharing the experience with the college community. Decisions are made by the International Advisory Committee and funds are administered by the director of international programs. For more information, contact Professor Gordon Campbell, Department of Microbiology, Immunology, and Parasitology.

NIH Summer Research Fellowships

As part of a National Health Sciences Manpower Program, the National Institutes of Health has awarded the college a training grant designed to provide introductory research experience for veterinary students during the summer months. Students selected for the program will participate actively in a research program being carried out in one of several specific college research laboratories. For more information, contact Dr. Robert M. Lewis, Department of Pathology.

Academic Program Development

Employment opportunities are available on a competitive basis to students interested in assisting faculty in the development of course materials for the D.V.M. curriculum. Specific projects include developing problem-based case tutorials and computer-assisted learning modules. For more information, contact Dr. Donald Smith, associate dean for veterinary education.

Leadership Training Program for Veterinary Students

For the past four years, the College of Veterinary Medicine at Cornell has hosted a Leadership Training Program for Veterinary Students. The program targets gifted students from Cornell and other veterinary colleges who aspire to leadership positions in academic institutions, government, or industry. Major objectives of the program are to acquaint the participating students with career opportunities for veterinarians, to assist them in planning their professional activities, and to establish a network that will encourage interaction among students later in their careers.

Successful applicants for admission to the program are awarded fellowships that enable them to spend 10 weeks at Cornell during June, July, and August. Student fellows engage in faculty-directed research and take part in a variety of professional enrichment activities that have been selected for their excellence and relevance to the program.

Features of the program include an honorarium, free in-residence housing, research experience, seminars and group discussions, a daylong visit to the research facilities of Merck Company, and a daylong program that features career counseling.

Application forms for admission to the 1994 program may be obtained by writing to Ms. Linda A. Griswold, Graduate Education Coordinator, College of Veterinary Medicine.

Aquavet

Aquavet I, a basic four-week intensive summer course introducing students to aquatic veterinary medicine, is co-sponsored by the School of Veterinary Medicine at the University of Pennsylvania and the College of Veterinary Medicine at Cornell. Aquavet II extends the basic course and permits more detailed study of specific areas of aquatic animal medicine. The program is conducted at Woods Hole, Massachusetts. More information may be obtained from Aquavet Associate Director, Dr. Paul Bowser, Department of Avian and Aquatic Animal Medicine.

College Students

Summer Employment Opportunity Program for Minority College Students

This eight-week program in the College of Veterinary Medicine provides an opportunity to obtain knowledge about veterinary college admissions requirements and to gain animal-related experience. Students are eligible to attend this program if they have a demonstrated interest in a career in veterinary medicine and have completed some of the course work required for admission to the veterinary program at Cornell. Students who identify themselves as African American, Hispanic, Native American, Alaskan Native, or Pacific Islander and are enrolled in college during the academic year prior to the start of the program are eligible to apply. Application material and further information may be requested from Ms. Shenetta Selden, multicultural affairs coordinator.

Pre-D.V.M. Advanced Pharmacology Training Program

The Department of Pharmacology makes funds available for a summer program in basic or clinical pharmacology. Students are selected on the basis of academic qualifications and potential interest in a career in pharmacology. Training, which will be for two or three successive summers, is in basic or clinical pharmacology, pharmacokinetics, or toxicology. Students may work in a different area each summer. The work will be structured to provide formal reading, study, and research under the personal supervision of a faculty member. The major goal of this program is to encourage highly talented individuals to enter a career of veterinary pharmacology. Interested students should contact Dr. Geoffrey W. G. Sharp, chair, Department of Pharmacology, on or before April 15.

High School Students

Explorations in Veterinary Medicine

Cornell University Summer College offers a six-week program for high school students interested in gaining realistic insights into modern veterinary medicine.

Through lectures, laboratories, visits, and demonstrations, students become acquainted with the wide range of disciplines within the profession. Students have the opportunity to meet current veterinary students and faculty involved in a variety of research and clinical programs. In addition, participating students take a freshman writing course and choose one or more courses from those offered by Summer College. Students successfully completing the program receive a certificate from Cornell University Summer College. For more information, write to Cornell University Summer College, Box 725, B12 Ives Hall, Ithaca, New York 14853-3901, or call 607-255-6203.

Research Apprentice Program for Minority High School Students

The purpose of this six-week program is to stimulate students to pursue careers in biomedical research. Students are assigned to investigators who are committed to developing in high school students both an understanding of the research in which they participate and the technical skills involved. Students are also assigned to other colleges and units at Cornell including the College of Agriculture and Life Sciences, the College of Human Ecology, and the Boyce Thompson Institute. Students who are U.S. citizens or permanent residents and who identify themselves as African American, Hispanic, Native American, Alaskan Native, or Asian/Pacific Islander are eligible to apply. Application material and further information may be requested from Ms. Shenetta Selden, multicultural affairs coordinator.

The Graduate School

Graduate Education

Graduate education at the College of Veterinary Medicine is administered by the Graduate School, located at Sage Graduate Center. Students who hold a baccalaureate or equivalent degree may apply for admission to the Graduate School with a view to pursuing graduate studies leading to the M.S. or Ph.D. degree.

Graduate education at Cornell is organized by Field of Study as opposed to discipline or department. The graduate fields of Veterinary Medicine, Physiology, and Immunology are the most highly represented in the College of Veterinary Medicine. On occasion, however, students find it expedient to enroll in other graduate fields such as Animal Science, Biochemistry, Environmental Toxicology, Microbiology, Neurobiology and Behavior, Nutrition, or Zoology. Each graduate field contains several areas of concentration. A description of each field, including its individual requirements and areas of concentration, is contained in the current Graduate School catalog and in *Peterson's Guide to Graduate Programs in the Biological, Agricultural, and Health Sciences*.

Combining the Professional (D.V.M.) and Graduate (Ph.D.) Degrees.

A combined D.V.M./Ph.D. program is offered by the College of Veterinary Medicine and the Graduate School. The program targets highly qualified students who aspire to an academic career. Students pursuing the combined degrees register in the Graduate School during summer vacation periods to obtain residence credits toward the Ph.D. degree. With proper planning, it is possible to complete the D.V.M./Ph.D. in six calendar years, although students typically take longer to complete their training.

Before a student can be considered as a combined-degree candidate, he or she must be accepted into the professional degree program. Therefore, the first step is application to the Office of Admissions, College of Veterinary Medicine, Cornell University. When the student has enrolled in the veterinary college, application can be made to the Cornell Graduate School. Additional information about the admission process can be obtained from the graduate education coordinator at the address given at the end of this section.

Combined-degree candidates major in a concentration within the field of their choice. The student's major professor must be a member of the graduate faculty of the student's field as well as a member of the faculty of the College of Veterinary Medicine.

First-year veterinary students with superior academic records and demonstrated research interests are encouraged to apply for admission to the combined program. Qualified applicants will be admitted only if the funding and research resources are available. Students are encouraged to express their interest in the combined-degree program at least six months before they register in the Graduate School. A student cannot be registered in both the College of Veterinary Medicine and the Graduate School at the same time; however, students may register in the college during the fall and spring terms and then register in the Graduate School during the summer semester. By doing so, students can earn 1/2 residence unit each summer semester up to a maximum of two units. After the veterinary degree is awarded, the student may petition the Graduate School to transfer two additional residence units for their time spent in the D.V.M. program. At least two residence units must be earned by full-time graduate study.

Special Programs in Graduate Education. Two new programs have been organized in the College of Veterinary Medicine: the Graduate Program in Cellular and Molecular Medicine and the Graduate Program for Veterinary Clinician Scientists. The new programs target exceptionally well qualified students who aspire to academic careers. They offer highly structured training experiences under the close supervision of faculty mentors who are nationally competitive research scientists. The programs are not linked to a single field or group of fields, and participation in them does not relieve students of their field obligations. Applicants for admission to the special programs must be accepted by the Cornell Graduate School and must remain in good standing in their graduate field.

Admission

Applicants are encouraged to communicate with one or more faculty members of the graduate field in which they are interested. These individuals may be identified by referring to the Graduate School catalog or communicating with the graduate faculty representative of the selected field. Applicants from countries outside the United States must submit a Test of English as a Foreign Language (TOEFL) score of 550 or greater if their native language is not English. This requirement applies to all fields.

Applications for admission to the Graduate School may be submitted any time; however, students who contemplate matriculation in the fall should submit their applications by March 1, and applications for spring matriculation should be submitted by October 1. Applications should be directed to the Graduate School, Sage Graduate Center, Cornell University, Ithaca, New York 14853-6201.

Financial Support

Most graduate students receive financial support from fellowships or graduate research/teaching assistantships. Seldom are students admitted to a graduate field without assurance that funding is available for the duration of their graduate studies.

Research assistantships and teaching assistantships are available from several sources: training grants, individual research grants and contracts, or by positions assigned to particular departments or operating units of the college. Approximately 20 assistantships are reserved for applicants with the D.V.M. degree. These are awarded annually following a college-wide competition, and are funded at a level comparable to that of other schools of veterinary medicine. The number of D.V.M. graduate assistantships awarded each year varies; however, two assistantships are reserved for the combined D.V.M./Ph.D. degree program. Fellowship support for up to three years is provided to students seeking the Ph.D. degree. Successful applicants who are newly enrolled in the Graduate School are provided an additional six months of support with the specific purpose of enabling students to rotate through three or more laboratories. The purpose of the rotation is to enable students to experience a variety of training opportunities before they designate their special committee chair.

During their D.V.M. studies, successful candidates for admission to the combined program will be assured of financial support at current work-study rates when they conduct relevant research during intersessions and summer breaks. Course work will not be subsidized during these periods, however. Once students have been awarded the D.V.M. degree and are enrolled as full-time students in the Graduate School, they will receive tuition (currently worth \$9,550 a year) and a minimum salary of \$19,292 a year with yearly increments. Decisions on the awards are made in early

spring of the year prior to fall matriculation. The deadline for submission of college D.V.M. graduate fellowship applications is December 17, 1993.

Graduate School fellowships are also available. These are awarded following a university-wide competition. Only the strongest of candidates are nominated by their respective fields. The deadline for submission of Graduate School Fellowship applications is January 10, 1994.

Graduate Record Examinations

The graduate fields at Cornell have varying requirements regarding the Graduate Record Examinations (GRE) general test. Clarification of the requirements can be obtained from the appropriate field representative. For applicants to the Field of Veterinary Medicine, the requirement for GRE scores may be waived for students from countries outside the United States if evidence is provided of superior academic performance (e.g., high class rank) as an undergraduate. Combined scores on the general test (verbal and quantitative) are expected to be 1200 or higher. Some fields (e.g., physiology) also require that the advanced subject test be completed.

Applicants for graduate training should arrange for their GRE scores to be sent directly to the Graduate School. This can be done at the time of registration by entering the Cornell Graduate School number, 2098, at the appropriate place in the test form.

Additional Information

Additional information on graduate education and Graduate School applications can be obtained by contacting the graduate education coordinator, Ms. Linda A. Griswold, Graduate Education Office, College of Veterinary Medicine, Cornell University, Ithaca, New York 14853-6401 (telephone: 607-253-3276; fax: 607-253-3756).

Graduate Faculty Representatives

Field of Veterinary Medicine

Graduate Faculty Representative:
Professor Karel A. Schat
Levine Laboratory
607-253-3364

Field of Physiology

Graduate Faculty Representative:
Professor John F. Wootton
722 Veterinary Research Tower
607-253-3465

Field of Immunology

Graduate Faculty Representative:
Professor Richard H. Jacobson
130 Diagnostic Laboratory
607-253-3677

Field of Microbiology

Graduate Faculty Representative:
Professor Stephen H. Zinder
Wing Hall
607-255-2415

Field of Toxicology

Graduate Faculty Representative:
Professor Ruth Schwartz
N-205A Martha Van Rensselaer Hall
607-255-2054

Field of Biochemistry

Graduate Faculty Representative:
Professor Joseph M. Calvo
451 Biotechnology Building
607-255-2437

Field of Zoology

Graduate Faculty Representative:
Professor Drew M. Noden
421 Veterinary Research Tower
607-253-3550

Field of Neurobiology and Behavior

Graduate Faculty Representative:
Professor Andrew Bass
W239 Seeley Mudd
607-255-7337

Internships and Residencies

Internships

The Veterinary Medical Teaching Hospital maintains active internship programs in ambulatory medicine (Ambulatory Clinic), large animal surgery (Large Animal Clinic), and small animal medicine and surgery (Small Animal Clinic).

Objectives

Internships are nondegree programs that provide training for practice, clinical teaching, and specialty board eligibility. Generally a one-year rotating internship in medicine and surgery is a prerequisite for specific residency programs and for board certification. Internships provide postgraduate education and training leading to a higher level of clinical proficiency.

Programs

Interns in the Small Animal Medicine and Surgery are assigned on a rotating basis to the Internal Medicine Service, the Soft Tissue Surgery Service, the Orthopedic Surgery Service, the Community Practice Service, and the Anesthesiology Service, in the Small Animal Clinic. Each service consists of one faculty member, a resident, an intern, and several fourth-year students.

Interns in Ambulatory Medicine are assigned to one of four geographic services of the Ambulatory Clinic, each of which is the responsibility of an individual faculty member. Schedules are arranged so that the intern has the opportunity to work with most of the faculty.

Interns in Large Animal Surgery spend most of their time assigned to either the Soft Tissue Surgery Service or the Orthopedic Surgery Service of the Large Animal Clinic. Interns do, however, spend approximately one month each year on assignment to the Large Animal Medicine Service.

Interns in all programs share weekend duty and the responsibility for emergency service on a rotating basis, with residents and senior faculty available for consultation. Residents assigned to each service are responsible for the direct supervision of interns and, along with faculty members, evaluate the performance of interns at the end of each rotation.

Interns are expected to attend and participate in hospital rounds and seminars. With permission, interns may attend a limited number of elective courses. Interns are generally required to prepare a clinical paper suitable for publication under the supervision of a faculty member of the intern's choice.

Residencies

The Veterinary Medical Teaching Hospital has clinical residency programs in anesthesiology, dermatology, large animal medicine, large animal surgery, ophthalmology, small animal medicine, small animal surgery, theriogenology, and ambulatory medicine.

Objectives

Residency programs provide the resident with a high level of academic and clinical proficiency in a specific clinical discipline. Each program allows the resident to meet the postgraduate education requirements of the specialty board related to that discipline. Residents gain experience in professional veterinary medical education and in teaching. Residency programs also provide training leading to a high level of specialized veterinary service to the public.

Programs

Residencies are divided between clinical and academic activities. During the course of the program approximately 70 percent of the time is devoted to clinical training and service while approximately 30 percent is spent in academic pursuits including research and didactic teaching opportunities. During clinical training periods each resident is supervised by the chief of the service to which the resident is assigned. Academic training is supervised by the section chief and designated faculty of the section representing the academic discipline. Each residency program consists of advanced clinical as well as academic training in a specific discipline. Progression through the program leads to increased responsibility for clinical case management as well as the opportunity to become involved in clinical research.

Descriptions of specific residency programs are available from the director of the Veterinary Medical Teaching Hospital.

Each clinical service consists of one faculty member, a resident, an intern, and several fourth-year students. The resident is responsible for the direct supervision of the intern on the service and participates in the clinical teaching of fourth-year students. Residents have the opportunity to work with all faculty involved in the respective clinical discipline.

A minimum of two calendar years is required for successful completion of residency programs in anesthesiology, dermatology, large animal medicine, small animal medicine, and ambulatory medicine. Three years of training are required for completion of residency programs in small animal surgery, large animal surgery, ophthalmology, and theriogenology. Opportunities for obtaining an advanced degree (master of science) are available with the residencies in large animal surgery and theriogenology.

Residencies in Veterinary Pathology

The Department of Pathology supports resident programs in anatomic and clinical pathology. These programs are designed to address a national need for veterinary diagnostic pathologists by providing disciplinary skills and efficiency in modern diagnostic/toxicologic pathology. The training consists of rotating exposure to the extensive case material available through the necropsy, surgical pathology, and clinical pathology

laboratories of the Veterinary Medical Teaching Hospital as well as the New York State Diagnostic Laboratory.

Learning via responsibility for diagnostic case work is supplemented by slide seminars, lectures, diagnostic journal clubs, tutorials, and rotation through specialty service laboratories in the department of Pathology and the NYS Diagnostic Laboratory.

Summer program courses are conducted in diagnostic electron microscopy, immunohistochemistry, *in situ* hybridization, laboratory animal pathology, and toxicologic pathology. Special courses include the Olafson Pathology Course and organ system workshops held annually with the faculty and students from the University of Guelph. The time spent in either the anatomical or clinical rack of the residency program is determined by the entry-level skill of the resident, but generally lasts two to three years.

Resident Program in Anatomic Pathology

Trainees will acquire considerable skill in the recognition and description of pathologic lesions, the formulation of morphologic diagnosis, the correlation of ante mortem functional changes with post mortem structural alterations, and

the conceptual approach to understanding the pathologic expression of a wide variety of disease processes affecting the common animal species. Specialty board certification by the ACVP is a primary goal of the program.

Resident Program in Clinical Pathology

Residents will acquire skills and knowledge in the areas of hematology, clinical biochemistry, clinical immunology, and diagnostic cytology. A period of participation in the surgical pathology services is provided for each resident. Residents develop their abilities to interpret laboratory results and morphologic patterns and to relate observations to pathologic and physiology processes. Residents also acquire knowledge of laboratory procedures and management through involvement in the laboratory operation.

San Diego Zoo Residency Program

Veterinarians who have completed a minimum of one year of pathology residency at Cornell University are eligible for a special one-year period of residency training in the pathology of exotic animal species. Trainees may return to complete their training at Cornell University.

Resources and Facilities

Academic Support Services

Roswell P. Flower - Isidor I. and Sylvia M. Sprecher Library and Learning Resources Center

The library was initially endowed by a gift from Roswell P. Flower, governor of the state of New York when the college was founded. In 1993 it was renamed as a result of a gift from Dr. and Mrs. Isidor I. Sprecher. Originally located on the second floor of Schurman Hall, the library was expanded into the Veterinary Education Center in 1993. A large reading room, which seats 50; display shelves for current journals; and areas for indexes, abstracts, and other reference books are provided. The three levels of adjoining stacks include journals and monographs and are open for use. Individual study carrels are also available on the lower compact shelving level.

The library contains more than 85,000 volumes and regularly receives nearly 1,200 periodicals and series titles. This represents a worldwide selection of veterinary titles plus publications in the biomedical sciences designed to support undergraduate, graduate, clinical, and research programs. Through the various libraries on campus, nearly 5,000,000 volumes and serials are available to students. These collections, interlibrary loans, and photoduplicated materials supplement the research potential of the veterinary library, which is rich in historical and basic research resources as well as recent monographs and selected government publications. A newsletter is issued periodically.

The library also features an online catalog which includes the holdings of all campus libraries, an automated circulation system, and access to various network resources.

Information on policies and suggestions for the use of the library are provided to students and faculty. A printed guide is also available. Additional instruction in bibliographic research is available for advanced problems.

The wide range of information services offered includes reference assistance, on-line literature searching, interlibrary loan, photoduplication, and current awareness such as our Table-of-Contents. In particular, the computer-assisted literature search service, called COMPASS at Cornell, provides rapid access to numerous bibliographic data bases. MEDLINE, CAB ABSTRACTS, and BIOSIS are also available on CD-ROM for convenient searching of the biomedical literature. Current awareness bibliographies can be generated each month through the on-line systems as well.

The library's audiovisual collection contains more than 1,400 titles in slide, audiotape, and videotape format. These media resources enhance academic programs as well as provide opportunities for self study.

A microcomputer facility was established in the library in 1985 and greatly expanded in 1988 to enhance the college's educational program. The microcomputers are available for use primarily by students and feature a variety of software, including word processing, an electronic spreadsheet,

data-base management, and desktop publishing, as well as computer-based tutorials. The classroom area, which features 20 microcomputers, supports course-related and other group-instruction uses.

Office of Educational Development

The faculty of the College are devoted to excellent teaching and care about the quality of students' learning. With the encouragement of the faculty of the college, the Office of Educational Development was established in 1990 under the directorship of Dr. Katherine M. Edmondson. The office provides support for faculty who wish to explore alternatives in teaching styles, improve a particular aspect of a course method, develop new curricular materials, or incorporate innovative approaches. Its staff includes an education specialist, a computer animator, and a medical illustrator. The office sponsors seminars on teaching and learning that are scheduled approximately twice each month, and various discussion series for faculty and teaching support specialists on such topics as improving the educational quality of small group learning, assessment, and curriculum design. A formal course for graduate students and residents is also planned to provide them with an opportunity to refine and develop a repertoire of necessary teaching skills.

Research, development, and evaluation of innovations are also conducted by the Office of Educational Development, as are more extensive longitudinal studies relevant to educational research.

Development of the new academic program and supporting facilities such as the Modular Resource Center represent the most significant projects undertaken by the faculty to innovate and improve educational offerings. Other efforts have included innovative approaches to cross-sectional anatomy and radiology, case-based approaches to teaching a range of disciplines and to testing, and the development of a variety of computer programs that include animations, simulations, tutorials, and an image database for pathologic slides and photographs. Students have been involved in almost all of these projects. They have been involved in the development and testing phases of all of the computer courseware, and their help has been very valuable in developing a variety of curricular materials. These initiatives are evidence of a concerted effort on the part of the faculty to develop an innovative and exciting curricular offering.

The Office of Educational Development is playing a pivotal role in the implementation of the new curricular program, sponsoring numerous workshops for faculty on the tutorial process and seeking student input in the development of new teaching materials. The office also works closely with other components of the College -- for example, the library and student services -- to ensure coherence and availability of the necessary support structure that faculty, staff and students need for veterinary education of the highest quality.

Biomedical Communications

The Biomedical Communications Service offers in-house services in photography, video production, and both photomacrography and photomicrography. Film processing, printing, copy photography for teaching slides, slide duplication, and clinical, surgical, and gross specimen photography are some of the services provided. Biomedical Communications is equipped with a Zeiss microscope and macrophotographic unit to photograph small biological specimens and microscope slides. Studio facilities are available for product photography and portraits. Video cameras, the services of an experienced videographer, and both 1/2" VHS and 3/4" video editing systems make possible the production of educational videotapes.

Center for Research Animal Resources

Cornell University established the Center for Research Animal Resources (CRAR) in 1980. The center's director, Dr. Fred W. Quimby, is responsible to the associate vice president for research. The center is charged with the responsibility of implementing animal care programs throughout the university to assure compliance with all state and federal laws regarding the use of animals for teaching, research, and testing. It is also responsible for providing the associate vice president for research and advanced studies, the University Animal Welfare Committee, and the Institutional Animal Care and Use Committee with information on developments in the field of animal welfare legislation and methods of compliance with new regulations.

CRAR offers instructional sessions to faculty, students, research technicians, and animal care technicians, introducing the participants to the ethics of using animals for research, the occupa-

tional health program for animal handlers, relevant federal and state regulations, and proper handling and restraint of common laboratory animals, as well as approved methods of euthanasia, available veterinary services, and the proper channels for reporting discrepancies in animal care.

The CRAR staff is also available to counsel and advise investigators, technicians, and others on procedures for proper housing, maintenance, care, sanitation, and disease control of animals and animal facilities. The center maintains information on the suitability of various animal models for research purposes and available alternatives to the use of living animals and regularly updates a listing of sources of disease-free animals.

The center assembles data required by state and federal legislation relative to animal care and use within the university and also maintains files and records all animal protocols for active research, teaching, and extension projects at Cornell.

The Center also offers a polyclonal (rabbit and goat) and monoclonal (mouse) antibody production service on a fee-for-service basis and maintains college (multi-user) cell biology laboratory equipped to develop, maintain and store primary and transformed cell lines.

Biomedical Electronics Service

This service provides on-site repair and maintenance of college equipment as well as design and construction of specialized equipment. The service performs preventive maintenance on a variety of centrifuges, microscopes, computers, and other equipment and offers consultation services on new equipment acquisition and use as well as training in instrumentation concepts and techniques.

Computing Services

The college has developed an integrated hospital computer system designed to meet the operational, administrative, and research needs of the teaching hospital and diagnostic laboratory. The interactive on-line system was developed using the MUMPS language and currently supports nearly 400 user terminals throughout the college. In addition, Computing Services also maintains a general-purpose local area network with central file and print services, access to University networking, and access to world-wide Internet.

Service Programs

Veterinary Medical Teaching Hospital

The Veterinary Medical Teaching Hospital (VMTH) has three missions: teaching, research, and professional service. The rural setting of Cornell University in a major agricultural area facilitates the availability of a significant large animal caseload; whereas, the city of Ithaca and surrounding urban centers of Syracuse, Rochester, Albany, and Buffalo provides an adequate number of routine and more complex secondary care small companion animal cases.

The VMTH provides clinical training for professional students in the D.V.M. curriculum, in particular, senior students who spend much of their fourth year engaged in the various clinical services of the three service units: the Large Animal Clinic, the Small Animal Clinic, and the Ambulatory Clinic. Training is under the close supervision of the faculty. The varied caseload ensures that all students will receive experience with both large and small animal species and in primary care medicine as well as in a variety of clinical specialties. The VMTH also provides advanced clinical training to graduate veterinarians who are enrolled in

internships or residency programs in specialty areas.

The second mission is clinical service. Combined caseload in the small and large animal clinics exceeds 15,000 per year. Principal patient care areas include medicine, surgery, ophthalmology, dermatology, cardiology, neurology, theriogenology, and dentistry. Ancillary specialty service areas include anesthesiology and radiology, the latter providing diagnostic ultrasound and nuclear medicine services. The large and small animal clinics serve as a referral center for veterinarians practicing within a radius of approximately 150 miles of the college. A significant portion of the caseload consists of complicated medical or surgical problems referred by practicing veterinarians for evaluation by specialists. The Community Practice Service is an active small animal service providing primary and healthy pet care for clients in the Ithaca area. This service has grown steadily since its inception in 1988. The Ambulatory Clinic provides on-site veterinary service to approximately 400 farms and stables in the upstate New York area. Many are dairy farms, but a significant number of other operations including horses, sheep, goats, and swine are also served by the practice.

The third mission of the VMTH is clinical research. Faculty are involved in developing safe new approaches to diagnosis and therapy. The clinical faculty provide the essential blend of medical, surgical, and investigative skills necessary to transfer and apply the discoveries of basic research in the clinical setting.

Diagnostic Laboratory

The Diagnostic Laboratory is a full-service laboratory that offers testing and consultation services in bacteriology, parasitology, virology, automated serology, toxicology, endocrinology, clinical pathology, and field services/exten-

sion for testing. Pathology services are offered jointly with the Department of Pathology. The Diagnostic Laboratory services patients of the Veterinary Medical Teaching Hospital, as well as those of veterinary practitioners in New York State and nationally. Its services are also used by researchers at Cornell as well as other universities and private industry. Research areas include new test development, automated testing, data handling, dissemination of information, pathogenesis, epidemiology, and preventive health programs. Recent research programs have led to the development of DNA probes for classifying enterotoxin and adhesions of pathogenic *E. coli*, a Lyme disease test for dogs and horses, an automated antibody test for infectious bovine rhinotracheitis, monoclonal antibody development for bovine diarrheal virus, improved culture techniques for *Salmonella* enteritidis, and management practices for the eradication of Johne's disease and bovine leukosis in cattle. An automated immunohistochemical staining process utilizing the horseradish peroxidase method for formalin-fixed tissue specimens is being used to develop specific diagnoses of several infectious diseases including rabies. Unique metabolic fatty acid profiles of isolates from *Salmonellosis* and Johne's disease cases in New York State are monitored and through a computer assisted program the epidemiological spread of these diseases are studied.

Through a contract with the New York State Department of Agriculture and Markets, the Diagnostic Laboratory is the state laboratory for animal health in New York as well as the accredited federal laboratory for the state. The laboratory provides testing for federal and state disease surveillance and control programs for bovine and porcine brucellosis,

equine infectious anemia, and pseudorabies in swine. The laboratory cooperates with various state animal industries and the New York State Department of Agriculture and Markets to provide a voluntary disease eradication and certified-free herd program for paratuberculosis (Johne's disease) and bluetongue in cattle and other ruminants and bovine leukosis in cattle. There is also an equine viral arteritis control program for the New York State Thoroughbred Breeding industry, a surveillance program for Potomac horse fever, and a surveillance program for *Salmonella enteritidis* in the state's egg-layer poultry industry.

The Diagnostic Laboratory operates a contagious equine metritis (CEM) quarantine station for the state and federal governments, certifying breeding mares and stallions to be free of CEM prior to release into this country.

The laboratory has developed a field force to study rabies control in New York State based on vaccination of wildlife populations (raccoon and fox). A trap-vaccination-release (TVR) approach for rabies control in an urban/suburban setting is underway in Ithaca, with one year of data showing effective reduction of raccoon rabies cases within the vaccinated area. Proposals for trial use of the unlicensed biologically engineered oral vaccine, vaccinia-rabies glycoprotein (VRT vaccine) in areas of New York State have been developed in consultation with the NYS Department of Agriculture and Markets, Health and Environmental Conservation and are awaiting Federal approval by the USDA Biologics Division. Various bait formulation, bait distribution and bait preference for eventual oral vaccination of raccoons are being studied.

New York State Quality Milk Promotion Services (QMPS) and Mastitis Control Program

These programs provide services to the New York dairymen and veterinary practitioners for the purpose of enhancing the quality of milk and the prevention of losses because of mastitis. Approximately 2,000 farms are visited annually. Bacteriological cultures from cows and bulk milk tanks are examined for the diagnosis of mastitis and more importantly for herd surveillance in mastitis prevention. The QMPS-Mastitis laboratory and field research are making major contributions in the diagnosis, treatment, control, and prevention of several infectious causes of mastitis including agents such as *Streptococcus agalactiae* and mycoplasma. Research continues on new methods of diagnosis, non-antibiotic therapy, and vaccines.

Reorganization of the program has resulted in four regional laboratories—in Canton, Cobleskill, Geneseo, and Ithaca. With new equipment and trained personnel, the regional laboratories will function as diagnostic satellite laboratories for all species, with expertise in general bacteriology and rapid serologic testing. The need for more sophisticated testing will be met through a courier service to the laboratory in Ithaca. A computer network and a telecommunication-fax system are used to meet rapid communication needs between the laboratories.

Equine Drug Testing and Research Program

The Equine Drug Testing and Research Program operates under a contract from the New York State Racing and Wagering Board. The program provides testing and research to guarantee the integrity of horse racing statewide. Laboratories for testing are located at all New York State pari-mutuel tracks. The central laboratory in

Ithaca is recognized nationally and internationally as a reference and research center. Recent research in the laboratory has led to the development of a series of immunoassays for the screening of drugs in horses. The development has provided a more effective, rapid, and less expensive screening technique. Chemical analyses of positive samples are still required for legal confirmation and the study of new drugs. Continued research on the detection and pharmacologic action of new drugs and chemicals is paramount to the integrity of the New York State horse racing industry, a major source of tax revenue for state and local governments.

Species-oriented Programs

James A. Baker Institute for Animal Health

Established in 1950 as the Veterinary Virus Research Institute, the institute changed its name in 1975 to honor the founding director's contributions to veterinary medicine and to reflect the broad scope of the institute's activities.

The institute comprises the Cornell Research Laboratory for Diseases of Dogs and the Cornell Equine Genetics Center. The institute's primary mission has been to prevent loss from infectious diseases in animals. To this end, basic research is conducted on disease-causing organisms to increase knowledge of their nature, means of spread, and methods of controlling their spread. The institute also provides advanced training in immunology, infectious diseases, and arthritis. The institute is currently adding faculty and programs in canine and equine reproduction and genetics and in inherited eye diseases of dogs.

In recent years, facilities have been renovated and expanded to accommodate increased program

activity utilizing contemporary methods of molecular and cell biology. Among the added facilities are buildings for the breeding and rearing of specific-pathogen-free dogs and laboratory rodents. A new laboratory complex for the study of inherited canine diseases is currently under construction.

Avian and Aquatic Animal Medicine

A multidisciplinary research program is carried out that encourages collaboration among faculty, staff, and graduate students. Major emphasis has traditionally been on the fields of virology and immunology, but bacteriology and parasitic diseases are also investigated. Laboratory space is located primarily at the P. Philip Levine Laboratory on Snyder Hill. A 41-unit isolation building for studies on infectious diseases is located on campus, and flocks of several genetically defined specific-pathogen-free chickens are maintained in secured buildings near the Levine Laboratory. These flocks provide chick embryos free of all diseases and antibodies for use in experimental studies.

Poultry diagnostic laboratories serving the chicken, duck, and turkey producers of the state are located in Ithaca and Eastport, Long Island. Research on economically important diseases of chickens, turkeys, and ducks and various aquatic species is conducted in Ithaca and Eastport laboratories. Vaccines for the duck industry are produced at Eastport.

At the Levine Laboratory, the Department of Avian and Aquatic Animal Medicine operates the Fish Diagnostic Laboratory, a facility designed to provide assistance to aquaculturalists and others experiencing problems with fish health.

Bovine Research Center

The Bovine Research Center at Cornell University fosters research to improve the productivity, health, and well-being of cattle. It serves scientists with expertise and interest in a broad spectrum of scientific disciplines related to the dairy and beef industries. It encourages cooperative research programs in health, metabolism, reproduction, breeding, and management for improved production.

Equine Research Park

The Equine Research Park, situated on 165 acres of land about one mile from the college, includes stall facilities for 90 horses and ponies and shed facilities for 60 horses. The park contains a half-mile track, a stallion barn, and a separate brood mare barn, where box stalls are provided for foaling mares. A laboratory for reproductive studies and a central breeding facility are located in the brood mare barn. Research at the park covers a variety of equine problems, including reproduction, nutrition, behavior, metabolism, infectious disease, and the special problems of the equine athlete.

The Equine Annex, which includes the Contagious Equine Metritis Quarantine facility, is a separate complex of buildings on Snyder Hill. Adjacent to the annex is a stable and laboratory for the study of equine embryo biology.

Equine Performance Testing Clinic

The Equine Performance Testing Clinic is the foundation of the college's developing program in Equine Sports Medicine. The centerpiece of the clinic is the SATO high-speed treadmill capable of speeds of 35 miles per hour and tilting to a 10 per cent slope. This facility also contains examination areas and laboratory space with

sophisticated examination and monitoring equipment. The clinic has greatly improved the ability of college veterinarians to examine and treat patients with respiratory problems, lameness, or substandard performance. Additionally, the clinic allows sophisticated research into important diseases affecting the performance of the equine athlete.

Cornell Feline Health Center

Formally approved in 1974, the Cornell Feline Health Center has received worldwide recognition for its work on feline infectious peritonitis, feline lentiviruses (feline immunodeficiency virus), feline leukemia, and respiratory diseases.

Educational outreach is accomplished through continuing education programs and publications. Two newsletters, *Feline Health Topics* (for practitioners) and *Perspectives on Cats* (for cat owners and breeders), are published quarterly and distributed to more than 30,000 people. In addition, the annual *Information Bulletin* provides scientific data on a major feline health concern. Client information brochures are available on a cost basis to practitioners for distribution to their clients.

The Feline Health Center is funded primarily through contributions from cat fanciers and veterinarians, bequests, the memorial program, memberships, and grants from government, industry, and foundations. The Dr. Louis J. Camuti Memorial Feline Consultation and Diagnostic Service is available for a fee to veterinarians and cat owners. A consulting veterinarian is on hand to answer health-related questions about cats, along with providing written information.

Faculty and Administration

University Administration

Frank H. T. Rhodes, *president*
Malden C. Nesheim, *provost*
Robert Michels, *provost for medical affairs*
James E. Morley Jr., *senior vice president*
Joyce W. Cima, *acting secretary of the corporation*
Henrik N. Dullea, *vice president for university relations*
Joycelyn R. Hart, *associate vice president for human relations*
Michael G. Kimberly, *acting university counsel*
M. Stuart Lynn, *vice president for information technologies*
Larry I. Palmer, *vice president for academic programs and campus affairs*
Richard M. Ramin, *vice president for public affairs*
Frederick A. Rogers, *vice president for finance and treasurer*
Norman R. Scott, *vice president for research and advanced studies*
John R. Wiesenfeld, *vice president for planning*
Peter C. Stein, *dean of the University Faculty*

College Administration

Robert D. Phemister, *dean*
Donald F. Smith, *associate dean for veterinary education*
Douglas D. McGregor, *associate dean for research and graduate education*
Eugenia G. Kelman, *assistant dean for student services*

John A. Lambert, *assistant dean for administration*
Timothy T. Redden, *assistant dean for public affairs*
Roger J. Avery, *chair, Department of Microbiology, Immunology, and Parasitology*
Bruce W. Calnek, *chair, Department of Avian and Aquatic Animal Medicine*
Cornelia E. Farnum, *chair, Department of Anatomy*
Brian R. H. Farrow, *chair, Department of Clinical Sciences*
Bendicht U. Pauli, *chair, Department of Pathology*
David Robertshaw, *chair, Department of Physiology*
Geoffrey W. G. Sharp, *chair, Department of Pharmacology*
Francis A. Kallfelz, *director, Veterinary Medical Teaching Hospital*
Donald H. Lein, *director, Diagnostic Laboratory*
Gustavo D. Aguirre, *director, James A. Baker Institute for Animal Health*
Gloria R. Crissey, *director of financial aid; registrar*
Rita W. Harris, *director of personnel*
Katherine M. Edmondson, *director of educational development*
Susanne K. Whitaker, *librarian, Flower-Sprecher Veterinary Library*
Linda F. Emmick, *director of development*
John M. Lewkowicz, *director of computing services*
Fred W. Quimby, *director of the Center for Research Animal Resources*
John E. Saidla, *director of continuing education*

S. Gordon Campbell, *director of international programs*
Fredric W. Scott, *director of the Cornell Feline Health Center*
Robert O. Gilbert, *director, Cornell Bovine Research Center*
Larry J. Thompson, *director of biosafety*
George A. Maylin, *director, Equine Drug Testing Program*
Philip M. Sears, *director, New York State Mastitis Control Program and Quality Milk Promotion Services*

Faculty

Anatomy

Professors

Cummings, John F., DVM, MS, PhD; anatomy
de Lahunta, Alexander, DVM, PhD, Dipl ACVIM; James Law Professor of Veterinary Anatomy
Noden, Drew M., PhD; anatomy

Associate Professor

Farnum, Cornelia E., DVM, PhD; anatomy; chair of the Department of Anatomy

Assistant Professors

Bertram, John E. A., MS, PhD; anatomy
Hermanson, John W., MS, PhD; anatomy

Lecturers

Hackett, M. Susan, DVM; anatomy
Mizer, Linda A., DVM, MS, PhD; anatomy

Instructors

Earnest-Koons, Kathy, DVM, MS
Valentine, Beth A., DVM, PhD

Emeritus Faculty Members

Evans, Howard E., PhD; veterinary and comparative anatomy
Habel, Robert E., DVM, MSc, MVD; anatomy
Sack, Wolfgang O., DVM, PhD, DrMedVet; anatomy

Avian and Aquatic Animal Medicine**Professors**

Bloom, Stephen E., MS, PhD; avian medicine
Calnek, Bruce W., DVM, MS, Dipl ACVM; avian medicine; chair of the Department of Avian and Aquatic Animal Medicine
Naqi, Syed A., BVSc, MS, PhD, Dipl ACVM; avian medicine
Schat, Karel A., DVM, PhD; avian medicine

Associate Professor

Bowser, Paul R., MS, PhD; aquatic animal medicine

Assistant Professor

Spitsbergen, Jan M., DVM, PhD, Dipl ACVP; aquatic animal medicine

Senior Extension Associate

Lucio-Martinez, Benjamin, DVM, MS, PhD; avian medicine

Senior Research Associate

Sandhu, Tirath S., BVSc, MS, PhD; avian medicine

Emeritus Faculty Members

Cole, Randall K., PhD; avian medicine
Fabricant, Julius, VMD, MS, PhD; avian medicine
Hitchner, Stephen B., VMD, Dipl ACVM; avian medicine
Leibovitz, Louis, VMD; aquatic animal medicine

Courtesy Faculty Members

Poston, Hugh A., MS, PhD; aquatic medicine
Rumsey, Gary L., MS, PhD; avian and aquatic medicine
Schachte, John, MS, PhD; aquatic medicine

Clinical Sciences**Professors**

Erb, Hollis N., DVM, MS, PhD; epidemiology
Farrow, Brian R.H., BVSc, PhD, MRCVS, FACVS; medicine; chair of the Department of Clinical Sciences
Hintz, Harold F., MS, PhD; animal nutrition; College of Agriculture and Life Sciences (joint appointment)
Kallfelz, Francis A., DVM, PhD, Dipl ACVN; medicine; director of the Veterinary Medical Teaching Hospital
Kollias, George V., DVM, PhD, Dipl ACZM; wildlife medicine
Norcross, Neil L., MS, PhD; immunology
Rebhun, William C., DVM, Dipl ACVO, Dipl ACVIM; medicine and ophthalmology
Scott, Danny W., DVM, Dipl ACVD; dermatology
Short, Charles E., DVM, MS, PhD, Dipl ACVA; anesthesiology
Smith, Donald F., DVM, Dipl ACVS; surgery; associate dean for veterinary education
Tennant, Bud C., DVM, Dipl ACVIM; James Law Professor of Comparative Medicine
White, Maurice E., DVM, Dipl ABVP; medicine

Associate Professors

Ball, Barry A., DVM, PhD, Dipl ACT; theriogenology
Center, Sharon A., DVM, Dipl ACVIM; medicine
Divers, Thomas J., DVM, Dipl ACVIM; medicine

Ducharme, Normand G., DMV, MSc, Dipl ACVS; surgery
Fubini, Susan L., DVM, Dipl ACVS; surgery
Gilbert, Robert O., BVSc, MMedVet, Dipl ACT; theriogenology
Gleed, Robin D., BVSc, MRCVS, DVA, Dipl ACVA; anesthesiology
Grohn, Yrjo T., BVSc, DVM, MPVM, MS, PhD; epidemiology
Guard, Charles, DVM, PhD; medicine
Hackett, Richard P., DVM, MS, Dipl ACVS; surgery
Harvey, H. Jay, DVM, Dipl ACVS; surgery
Hornbuckle, William E., DVM, Dipl ACVIM; medicine
Kern, Thomas J., DVM, Dipl ACVO; ophthalmology
Ludders, John W., DVM, Dipl ACVA; anesthesiology
Miller, William H., Jr., VMD, Dipl ACVD; dermatology
Mohammed, Hussni O., BVSc, DPVM, MPVM, PhD; epidemiology
Moise, N. Sydney, DVM, MS, Dipl ACVIM; cardiology
Nixon, Alan J., BVSc, MS, Dipl ACVS; surgery
Randolph, John F., DVM, Dipl ACVIM; medicine
Rendano, Victor T., VMD, MS, Dipl ACVR; radiology
Riis, Ronald C., DVM, MS, Dipl ACVO; ophthalmology
Scarlett, Janet M., DVM, MPH, PhD; epidemiology
Smith, Mary C., DVM, Dipl ACT; medicine
Trotter, Eric J., DVM, MS, Dipl ACVS; surgery

Assistant Professors

Ainsworth, Dorothy, DVM, MS, PhD, Dipl ACVIM; medicine
Barr, Stephen C., BVSc, MVS, PhD, Dipl ACVIM, MACVSc; medicine

Daels, Peter F., DVM, PhD;
theriogenology

Dykes, Nathan L., DVM, Dipl ACVR;
radiology

Mechor, Gerald D., DVM, MVSc;
medicine

Moon, Paula F., DVM, Dipl ACVA;
anesthesiology

Reynolds, Arleigh J., DVM, PhD;
nutrition, medicine

Senior Clinician

Hillman Robert B., DVM, MS, Dipl
ACT; theriogenology

Instructors

Irby, Nita, DVM, Dipl ACVO; ophthal-
mology

Linn, Kathleen A., DVM, MS; surgery

Looney, Andrea L., DVM; medicine

Yeager, Amy E., DVM, Dipl ACVR;
radiology

Emeritus Faculty Members

Fox, Francis H., DVM, Dipl ACVIM;
medicine

Kirk, Robert W., DVM, Dipl ACVIM,
Dipl ACVD, Dipl ABVP; medicine

Lowe, John E., DVM, MS; surgery

McEntee, Kenneth, DVM, PhD, Dipl
ACVP, Dipl ACT; pathology

Melby, Edward C., Jr., DVM, Dipl
ACLAM; medicine

Postle, Donald S., DVM, MS; veteri-
nary science

Roberts, Stephen J., DVM, MS, Dipl
ACT; medicine, theriogenology

Schryver, Herbert F., DVM, PhD;
nutrition

Adjunct Faculty Members

VanPoznak, Alan, MD; anesthesiology

Edwards, N. Joel, DVM; medicine

Fredrickson, Bruce E., MD; compara-
tive orthopedics

Kessler, Matt J., DVM; medicine

Morris, Mark L., DVM, MS, PhD;
medicine

Diagnostic Laboratory

Professor

Henion, John D., MS, PhD; toxicology

Associate Professors

Dubovi, Edward J., MS, PhD; micro-
biology

Jacobson, Richard H., MS, PhD;
immunoparasitology

Lein, Donald H., DVM, PhD, Dipl
ACVP; theriogenology; director of the
Diagnostic Laboratory

Maylin, George A., DVM, MS, PhD;
toxicology and environmental health

Reimers, Thomas J., MS, PhD;
endocrinology

Sears, Philip M., DVM, PhD; micro-
biology

Shin, Sang J., DVM, Dipl ACVM;
microbiology

Assistant Professors

Chang, Yung-Fu, DVM, MS, PhD, Dipl
ACVM; microbiology

McDonough, Patrick L., MS, PhD;
microbiology

Senior Research Associates

Cheng, Chao-Fu, MS, PhD; pathology

Gonzalez, Ruben N., DVM, MPVM,
PhD; microbiology

Lopez, Jorge W., DVM, MS, PhD;
virology

Wade, Susan E., MA, PhD; parasitology

Senior Extension Associates

Bennett, Gary J., DVM; Diagnostic

Laboratory

Brunner, Michael A., PhD, DVM;
Diagnostic Laboratory

Richards, James R., DVM; Cornell
Feline Health Center

Saidla, John E., DVM; dentistry;
director of continuing education

Schulte, Hal F., III, MS, DVM; Diag-
nostic Laboratory

Thompson, Larry J., DVM, PhD;
Diagnostic Laboratory; director of
biosafety

Wilson, David J., DVM, MS; Diagnostic
Laboratory

Field Veterinarian

Julius, Frederic S., DVM; mastitis
control (Kingston)

Adjunct Faculty Member

House, James A., DVM, MS, PhD

James A. Baker Institute for Animal Health

(Department affiliation)

Professors

Aguirre, Gustavo D., VMD, PhD;
ophthalmology; Alfred H. Caspary
Professor of Ophthalmology (Clinical
Sciences)

Antczak, Douglas F., VMD, PhD;
Dorothy Havemeyer McConville
Professor of Equine Medicine (Micro-
biology, Immunology and Parasitol-
ogy)

Appel, Max J., DVM, PhD; virology
(Microbiology, Immunology and
Parasitology)

Bell, Robin G., PhD; immunology
(Microbiology, Immunology and
Parasitology)

Carmichael, Leland E., DVM, PhD,
Dipl ACVM; John M. Olin Professor of
Virology (Clinical Sciences)

Lust, George, PhD; physiological
chemistry (Microbiology, Immunol-
ogy and Parasitology)

Associate Professor

Appleton, Judith A., MS, PhD; immunology (Microbiology, Immunology and Parasitology)

Assistant Professors

Macleod, James N., VMD, PhD; molecular biology (Physiology)

Meyers-Wallen, Vicki N., VMD, PhD, Dipl ACT; theriogenology (Clinical Sciences)

Parrish, Colin R., PhD; virology (Microbiology, Immunology and Parasitology)

Ray, Jharna, MS, PhD; biochemistry

Senior Research Associates

Acland, Gregory M., BVSc; ophthalmology

Hershfield, Bennett, PhD; molecular genetics and cell biology

Ray, Kunal, MS, PhD; molecular genetics

Wurster, Nancy Burton, MS, PhD; physiological chemistry

Emeritus Faculty Member

Sheffy, Ben E., MS, PhD; nutrition

Microbiology, Immunology, and Parasitology**Professors**

Avery, Roger J., PhD; virology; chair of the Department of Microbiology, Immunology, and Parasitology

Campbell, S. Gordon, MVSc, PhD; immunology

Dietert, Rodney R., PhD; immunology and genetics

Marsh, James A., MS, PhD; immunology and animal physiology

McGregor, Douglas D., MD, D Phil; immunology; associate dean for research and graduate education

Noronha, Fernando M., DVM; virology

Scott, Fredric W., DVM, PhD, Dipl ACVM; virology

Winter, Alexander J., DVM, MS, PhD, Dipl ACVM; James Law Professor of

Veterinary Microbiology

Associate Professors

Bowman, Dwight D., MS, PhD; parasitology

Casey, James W., PhD; virology

Assistant Professors

Baines, Joel, DVM, PhD; virology

Pearce, Edward J., PhD; immunology and parasitology

Senior Lecturers

Winter, Lola E., MS; microbiology

Instructors

Davies, Christopher J., DVM, PhD

Tullson, Elaine D., DVM, PhD; microbiology

Emeritus Faculty Members

Bruner, Dorsey W., PhD, DVM, Dipl ACVM, ABM; microbiology

Georgi, Jay R., DVM, PhD; parasitology

Gillespie, James H., VMD, Ch Dipl ACVM; microbiology

Poppensiek, George C., VMD, MS; Dipl ACVM, Dipl ACVPM; James Law Professor of Comparative Medicine

Whitlock, John H., DVM, MS; parasitology

Adjunct & Courtesy Faculty Members

Blissard, Gary W., MS, PhD

Golemboski, Karen A., PhD

Pathology**Professors**

King, John M., DVM, PhD, Dipl ACVP; pathology

Krook, Lennart, DVM, PhD; pathology

Lewis, Robert M., DVM, Dipl ACVP; pathology

Minor, Ronald R., VMD, PhD; pathology

Pauli, Bendicht U., MS, DVM, PhD; pathology; chair of the Department of Pathology

Phemister, Robert D., DVM, PhD, Dipl ACVP; pathology; dean of the college

Associate Professors

Blue, Julia T., DVM, PhD, Dipl ACVP; clinical pathology

Cooper, Barry J., BVSc, PhD, Dipl ACVP; pathology

French, Tracy W., DVM, Dipl ACVP; clinical pathology

Quimby, Fred W., VMD, PhD, Dipl ACLAM; pathology

Schlafer, Donald H., DVM, MS, PhD, Dipl ACVP, Dipl ACT, Dipl ACVM; pathology

Summers, Brian A., BVSc, MSc, PhD, Dipl ACVP; pathology

Yen, Andrew, MS, PhD; pathology

Assistant Professors

Guan, Jun-Lin, PhD; pathology

Levine, Roy, MA, PhD; pathology

Rowland, Peter H., DVM, Dipl ACVP; pathology

Emeritus Faculty Members

Bentinck-Smith, John, DVM, Dipl ACVP; clinical pathology

Boyer, Clyde I., Jr., VMD, MS, Dipl ACLAM; laboratory animal medicine

McEntee, Kenneth, DVM, Dipl ACVP; pathology

Adjunct Faculty Members

Black, Jonathan, ME, PhD; pathology

Mebus, Charles A., DVM, MS, PhD; pathology

Nosanchuk, Jerome S., MD; clinical pathology

Posso, Manuel, MD (adjunct); comparative pathology

Wood, Philip A., DVM, MS, PhD; pathology

Donnelly, Thomas, BVSc; laboratory animal medicine

Pharmacology

Professors

Cerione, Richard A., PhD; pharmacology
 Oswald, Robert E., PhD; pharmacology
 Schwark, Wayne S., DVM, MSc, PhD; pharmacology
 Sharp, Geoffrey W.G., PhD, DSc; pharmacology; chair of the Department of Pharmacology

Associate Professors

Babish, John G., PhD; toxicology
 Fewtrell, Clare, D Phil; pharmacology
 Nowak, Linda M., PhD; pharmacology
 Weiland, Gregory A., PhD; pharmacology

Senior Research Associate

Eddlestone, Geoffrey T., PhD; pharmacology

Physiology

Professors

Beyenbach, Klaus W., PhD; physiology; College of Agriculture and Life Sciences
 Dobson, Alan, MA, PhD, ScD; physiology
 Fortune, Joanne E., MS, PhD; physiology
 Houpt, Katherine A., VMD, PhD; physiology
 Houpt T. Richard, VMD, MS, PhD; physiology
 Nathanielsz, Peter W., MB, PhD, MD; reproductive biology
 Robertshaw, David, BVMS, PhD; physiology; chair of the Department of Physiology/Section of Physiology
 Tapper, Daniel N., VMD, PhD; physiology
 Wasserman, Robert H., MS, PhD; James Law Professor of Physiology
 Wootton, John F., MS, PhD; biochemistry

Associate Professors

Corradino, Robert A., MS, PhD; physiology
 Gilmour, Robert F., Jr., PhD; physiology
 Loew, Ellis R., MA, PhD; physiology; College of Agriculture and Life Sciences
 Quaroni, Andrea, PhD; physiology; College of Agriculture and Life Sciences
 Silver, Robert B., PhD; physiology; College of Arts and Sciences

Assistant Professor

Myers, Dean A., MS, PhD; physiology
 Sirois, Jean, DVM, MSc, PhD; physiology

Senior Lecturers

McFadden, Carol H., MAT, PhD; physiology

Senior Research Associates

Concannon, Patrick W., MS, PhD; physiology
 Fullmer, Curtis S., MNS, PhD; physiology
 Wentworth, Richard A., MS, PhD; physiology

Lecturer

Rawson, Richard E., DVM, PhD; physiology

Postdoctoral Associate

Paul, Eileen C.A., PhD; physiology

Emeritus Faculty Members

Gasteiger, Edgar L., MS, PhD; physiology
 Hansel, William, MS, PhD; Liberty Hyde Bailey Professor of Animal Physiology
 Lengemann, Fred W., MNS, PhD; physiology
 Sellers, Alvin F., VMD, MSc, PhD; physiology

Elected Committees**General Committee**

H.N. Erb (1991-94), Chair
 R.D. Gleed (1991-94)
 R.H. Jacobson (1993-96)
 J.M. Scarlett (1992-95)
 D.H. Schlafer (1992-95)
 S.L. Fubini (Sept 1993-Mar 1994)

University Appeals Panel

J.T. Blue (1989-94)
 H.J. Harvey (1990-95)
 T.J. Reimers (1991-96)
 B.A. Summers (1992-97)
 W.S. Schwark (1993-98)

Curriculum Committee

J.F. Cummings (1/92-12/94)
 T.J. Divers (1/92-12/94)
 R.O. Gilbert (1/93-12/95)
 R.F. Gilmour (1/92-12/94)
 T.J. Reimers (1/93-12/95)
 D.W. Scott (1/92-12/94)
 J.F. Wootton (1/92-12/94)
 Pending (1/94-12/96)
 Pending (1/94-12/94)
 K.M. Edmondson, *ex officio*
 D.F. Smith, *ex officio*

Faculty Council of Representatives

B.A. Ball (1992-95)
 J.W. Casey (1992-95)
 E.J. Dubovi (1993-96)
 J.W. Hermanson (1992-95)
 F.A. Kallfelz (1993-96)
 V.N. Meyers-Wallen (1991-94)
 J.F. Randolph (1993-96)

Non-elected Committees**Academic Council**

D.F. Smith, Chair
 D.D. Bowman
 B.J. Cooper
 K.M. Edmondson
 C.E. Farnum
 B.R.H. Farrow
 S.L. Fubini
 R.O. Gilbert
 R.P. Hackett
 L.A. Mizer
 D.M. Noden
 J.E. Saidla
 D.N. Tapper

Admissions

R.O. Gilbert, Chair
 A. de Lahunta
 T.W. French
 C.L. Guard
 H.J. Harvey
 K.A. Houpt
 T.J. Kern
 G. Lust
 W.S. Schwark

Affirmative Action Committee

S.A. Naqi, Chair
 R.G. Bell
 C.E. Farnum
 C.M.S. Fewtrell
 K.A. Houpt
 R.R. Minor
 R.C. Riis
 D.N. Tapper
 S.J. Selden, *ex officio*
 Student Representative: S. Mullings

Biohazard Safety Committee

E.J. Dubovi, Chair
 D.D. Bowman
 L.E. Carmichael
 P.L. McDonough
 T.J. Reimers
 F.W. Quimby, *ex officio*
 L.J. Thompson, *ex officio*

Centennial Committee

B.C. Tennant, Chair
 J.J. Brennan
 B.W. Calnek
 S.G. Campbell
 L.E. Carmichael
 C.E. Farnum
 E.A. Fontana
 R.C. Grambow
 F.A. Kallfelz
 D.H. Lein
 R.M. Lewis
 G.C. Poppensiek
 J.E. Saidla
 G.W.G. Sharp
 R.H. Wasserman
 S.K. Whitaker

Computer Advisory Committee

R.E. Oswald, Chair
 J.E.A. Bertram
 B.J. Cooper
 N.L. Dykes
 Y.T. Grohn
 R.H. Jacobson
 J.W. Ludders
 R.R. Minor
 H.O. Mohammed
 C.R. Parrish
 S.D. Rutherford

Oversight Committee for Conflicts of Interest/Commitment

D.D. McGregor, Chair

B.W. Calnek

S.G. Campbell

B.U. Pauli

Department Chair representative, as indicated

Common Environment Committee

J. Ludders, Chair

J.T. Blue

P.R. Bowser

C.M.S. Fewtrell

J.W. Hermanson

J.A. Lambert

E.G. Kelman

T.T. Redden

T.J. Reimers

F.W. Scott

E. Glass, Class of 1995

Continuing Education Committee

J.E. Saidla, Chair

L.A. Alfreds, Program Coordinator

M.A. Brunner

T.J. Divers

N.G. Ducharme

F.H. Fox

H.J. Harvey

W.H. Miller

W.S. Schwark

Committee on Deficient Students

R.C. Riis, Chair

C.M. Fewtrell

S.L. Fubini

Emeritus Professors Advisory Committee

E.L. Gasteiger, Chair

R.J. Avery

H.E. Evans

J. Fabricant

W.E. Hornbuckle

D.S. Postle

International Advisory Committee

S.G. Campbell, Chair

R.N. Gonzalez

R.H. Jacobson

F.A. Kallfelz

S.A. Naqi

D. Robertshaw

S.J. Shin

Student Representatives:

Beauvais, C., '95

Fosgate, G., '96

Rekers, W., '95

Westerdahl, M., '96

Committee on the Use of Live Animals in Teaching

P.W. Concannon, Chair

P.F. Daels

N.G. Ducharme

M.S. Hackett

B.A. Summers

Modular Resource Center Committee

L.A. Mizer, Chair

D.D. Bowman

K.M. Edmondson

B.R.H. Farrow

R.E. Rawson

J.E. Saidla

B.A. Valentine

College Research Council

R.R. Minor, Chair

B.A. Ball

L.E. Carmichael

R.F. Gilmour

Y.T. Grohn

J. Marsh

D.M. Noden

J. Fabricant, reviewer

G.A. Maylin, reviewer

A. van Tienhoven, reviewer

Scholarship Committee

H.J. Harvey, Chair

L.A. Mizer

A.J. Nixon

G.R. Crissey, *ex officio*

T.T. Redden, *ex officio*

Senior Seminar Committee

F.H. Fox, Chair

R.O. Gilbert

W.E. Hornbuckle

T.R. Houpt

J.M. King

M.C. Smith, (*sabbatic 1993-94*)

Library Committee

T.R. Houpt, Chair

D. Ainsworth

J.A. Appleton

Y.F. Chang

R.A. Corradino

H.E. Evans

S.L. Fubini

J.L. Guan

J. Ray

D.D. McGregor

J.M. Spitsbergen

S.K. Whitaker, *ex officio*

College Advisory Council

Richard C. Grambow, D.V.M.
(chair)

Donald P. Berens

Stephen J. Ettinger, D.V.M.

Albert Fried, Jr.

Ralph W. F. Hardy, Ph.D.

John Patrick Jordan, Ph.D.

John L. Mara, D.V.M.

Anne E. McElroy, Ph.D.

Mark L. Morris, Jr., D.V.M., Ph.D.

Bernard W. Potter (Trustee)

Kenneth J. Rotondo, D.V.M.

James L. Seward

Richard J. Sheehan, D.V.M.

David Sheperd

Patricia L. Thomson, D.V.M.

Kent R. Van Kampen, D.V.M., Ph.D.

Patricia Wehle

Stephen H. Weiss (Trustee)

Bruce Widger, D.V.M. (Trustee
Emeritus)

William E. Zitek, D.V.M.

Harold M. Zweighaft, D.V.M.

Description of Courses

Foundation Courses (Class of 1997)

In foundation courses I, II, III and IV (VTMED 510, 520, 530 and 540), students work in small groups under the guidance of a faculty tutor. Case-based exercises are used to facilitate the understanding of basic science concepts within the context of clinical medicine. On average, 3-4 two-hour tutorial sessions are scheduled each week. These are supplemented by lectures (usually 2-3 per week), laboratories, and discussion sessions or other organized learning opportunities specific to the individual course. Faculty are available to respond to questions which arise as a result of the case-based exercises.

Tutorial sessions and all other organized learning programs are usually scheduled during the mornings, thereby reserving the afternoons for independent study. By situating learning in a clinical context, students are better able to integrate material from the basic and clinical sciences, and are encouraged to develop an understanding of the clinical reasoning process from the beginning of the curriculum. The tutorial-based educational format creates an atmosphere which requires students to be involved actively in their learning, and allows them to develop skills in communication, information retrieval and analysis.

VTMED 510 The Animal Body (Foundation Course I)

Fall (August 26-November 11, 1993). 12 credits. Limited to first-year veterinary students. Letter grades only. C.E. Farnum (course leader) and others.

This course is designed to enable students to understand the principles of veterinary anatomy at the gross, microscopic and ultrastructural levels. Developmental anatomy is emphasized to the extent that it reflects determination of adult form and species differences. Radiologic and related imaging techniques are used throughout the course to assist in the understanding of normal structural anatomy. Understanding of the anatomic basis of common surgical procedures is achieved during the various dissection procedures. The course is tutorial based (group size of six) with significant emphasis on practical laboratories. Lectures and modules supplement student learning.

VTMED 517 Animals, Veterinarians and Society: Part A (Foundation Course VIIa)

Fall (August 26-November 11, 1993). 1 credit. Limited to first-year veterinary students. Letter grades only. J.E. Saidla (course leader) and others.

This course is the correlate for VTMED 510 The Animal Body. The principal objective is the development of physical examination skills of the major animal species for each of the body regions. This will be accomplished by participation in a two hour laboratory each week, correlated to the body region being studied during that week. In

addition to physical examination by external observation, auscultation and palpation, students will be introduced to invasive diagnostic procedures, such as venipuncture and cystocentesis.

VTMED 520 Genetics and Development (Foundation Course II)

Fall, spring (November 12, 1993-January 26, 1994). 8 credits. Limited to first-year veterinary students. Prerequisite: VTMED 510 The Animal Body. Letter grades only. D.M. Noden (course leader) and others.

This course emphasizes cellular and genetic control mechanisms. Four basic processes - cell proliferation, cell movement, cell differentiation, morphogenesis - are studied. These processes are essential to living systems, but may be regulated differently in embryonic and mature cells and tissues. Tutorial cases are used to illustrate these basic processes and to initiate explorations of the mechanisms that regulate them. Tutorial sessions (group size of six) are supplemented by lectures, laboratories, minicase discussions, and modules.

VTMED 527 Animals, Veterinarians and Society: Part B (Foundation Course VIIb)

Fall, spring (November 12, 1993-January 26, 1994). 1 credit. Limited to first-year veterinary students. Prerequisite: VTMED 517 Animals, Veterinarians and Society: Part A. Letter grades only. J.E. Saidla (course leader) and others.

This course is the correlate for VTMED 520 Genetics and Development. It enters into a study of ethical issues that are related to animal genetics, animal welfare, use of animals in research, clinical application of genetics, the current state of human medical genetic screening, and ethics in society. Students will meet for one 2-hour session each week.

VETA 504 Neuroanatomy and Clinical Neurology

Spring (January 27-March 18, 1994). 3 credits. Limited to first-year veterinary students. Letter grades only. A. de Lahunta.

Fundamentals of functional neuroanatomy and diseases of the nervous system are taught so that each student is competent in the diagnosis of clinical neurologic disorders of domestic animals. This is a vertically integrated course that includes dissection of the central nervous system of the dog, the anatomical basis for the diagnosis of diseases of the nervous system, and the differential diagnosis of those diseases. Clinical cases with pertinent lesions are demonstrated with each system. Films of clinical patients are used to demonstrate the clinical signs produced by the various diseases. Slides of gross and microscopic lesions are used to emphasize the clinical and neuroanatomic relationships and to stress characteristic features of representative conditions.

VTMED 530 Function and Dysfunction: Part I (Foundation Course III)

Spring (March 28-May 20, 1994). 9 credits. Limited to first-year veterinary students. Prerequisite: VTMED 520 Genetics and Development. Letter grades only. B.J. Cooper (course leader) and others.

This course is designed to develop students' understanding of how an animal maintains itself as a functional organism; how this is achieved through the integration of different functional organ systems; how tissue structure relates to tissue function; how injury alters structure and leads to dysfunction, manifested as clinical signs; how organ function can be assessed; and, how it can be modulated pharmacologically. The course incorporates aspects of physiology, biochemistry, cell biology, histology, pathology and histopathology, clinical pathology and pharmacology.

VTMED 537 Animals, Veterinarians and Society: Part C₁ (Foundation Course VIIc)

Spring (March 28-May 20, 1994). 1 credit. Limited to first-year veterinary students. Prerequisite: VTMED 527 Animals, Veterinarians and Society Part B. Letter grades only. J.E. Saidla (course leader) and others.

This course is the correlate for VTMED 530 Function and Dysfunction: Part I. The central goal of this course is to provide students with the interpersonal skills and techniques necessary to effectively communicate with clients. In addition, students will be provided an opportunity to learn the techniques for handling information such as constructing a complete medical record, retrieving needed information and critically appraising the literature.

[VTMED 531 Function and Dysfunction: Part II (Foundation Course III, continued)

Fall. 7 credits. Limited to second-year veterinary students, beginning with students in the Class of 1997. Prerequisite: VTMED 530 Function and Dysfunction: Part I. Letter grades only. B.J. Cooper (course leader) and others. Offered first in fall 1994.

A continuation of VTMED 530 Function and Dysfunction: Part I.]

[VTMED 538 Animals, Veterinarians and Society: Part C₂ (Foundation Course VIIc, continued)

Fall. 1 credit. Limited to second-year veterinary students, beginning with students in the Class of 1997. Prerequisites: VTMED 537 Animals, Veterinarians and Society: Part C₁. Letter grades only. J.E. Saidla (course leader) and others. Offered first in fall 1994.

This course is a continuation of VTMED 537 Animals, Veterinarians and Society: Part C₁.]

[VTMED 540 Host, Agent, and Defense (Foundation Course IV)

Fall. 12 credits. Limited to second-year veterinary students, beginning with students in the Class of 1997. Prerequisite: VTMED 531 Function and Dysfunction: Part II. Letter grades only. D.D. Bowman (course leader) and others. Offered first in fall 1994.

This course is divided into six sections: the host response, the intracellular environment, the extracellular environment, the somatic environment, the external environment, and the surrounding environment. Using this approach, students develop: an understanding of the host response to insult; a familiarity with groups of important pathogens; an understanding of how pathogens manipulate the host, and how the host defends itself against attacks; and an understanding of the roles played by the external environment and human intervention in the epidemiology of infectious organisms.]

[VTMED 547 Animals, Veterinarians and Society: Part D (Foundation Course VIId)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisites: VTMED 538 Animals, Veterinarians and Society: Part C₂. Letter grades only. J.E. Saidla (course leader) and others.

This course is the correlate for VTMED 540 Host, Agent, and Defense. This course will emphasize comprehensive care in single animals or populations of animals. Some topics include life cycles, preventing disease, environmental health, vaccines, and regulatory medicine.]

Distribution Courses (Class of 1997)

Distribution courses comprise thirty percent of the curriculum and are scheduled during the first half of each spring semester. During the first two years, many of the distribution courses are oriented to the basic sciences. During years three and four, however, students will have additional Distribution course offerings from which to choose. Some will emphasize clinical specialties; whereas, others will integrate basic science disciplines with clinical medicine and will be co-taught by faculty representing both areas. Students from different classes will have the opportunity to take many of these courses together.

VTMED 601 Anatomy of the Carnivore

Spring. 3 credits. Prerequisite: VTMED 510 The Animal Body, or permission of the instructor. Letter grades only. L.A. Mizer, coordinator.

Carnivore anatomy is studied by detailed systematic and regional dissection of the dog and cat, supplemented by the use of prosections. The lectures augment the laboratory dissection. Students will complete an independent dissection or research project in an area of particular interest to them and present their project in a seminar format.

VTMED 602 Anatomy of the Horse

Spring. 3 credits. Prerequisite: VTMED 510 The Animal Body. Letter grades only. J.W. Hermanson.

The topographic anatomy of the horse is studied by dissection with concentration devoted to regions and topics that are of particular biologic and clinical interest. Dissection and discussion is conducted in small groups. Each student will be required to give at least one oral presentation in conjunction with a laboratory partner that focuses on the lesson of a given week's dissection. Radiologic study will be focused on specified aspects of appendicular anatomy. The relationship between form and function will be emphasized throughout the course.

VTMED 603 Anatomy of the Ruminant

Spring. 3 credits. Prerequisite: VTMED 510 The Animal Body, or permission of the instructor. Letter grades only. M.S. Hackett.

The regional anatomy of several ruminant species will be covered using dissection laboratories, lectures, and large-group discussions. Functional consequences of structural modifications and anatomical features directly relevant to clinical practice will be emphasized. Microscopic anatomy will be correlated with gross anatomy when appropriate to relate structure to function and to provide a foundation for later study in pathology.

Student dissection material will be supplemented by skeletal materials, radiographs, models, pre-dissected specimens, and postmortem specimens. Students will be required to complete an independent study project on a relevant subject of their choice.

VTMED 604 Comparative Anatomy: Pattern and Function

Spring. 3 credits. Prerequisite: VTMED 510 The Animal Body. Letter grades only. J.E.A. Bertram.

The goal of this course is to remove the confusion surrounding anatomical variability among amniote species (mammals, birds and reptiles). This is accomplished by reducing the anatomy of major organ systems in each species to a common basic pattern and relating the differences to functional and historical considerations. Six major systems will be explored (integumentary, locomotory, neurosensory, cardiorespiratory, digestive and urogenital) in a variety of species (as available).

VTMED 605 Biomechanics: Concepts and Techniques (also VETA 604)

Spring. 2 credits. Letter grades only. J.E.A. Bertram.

This course is an introduction to biomechanics theory and analysis strategy for various aspects of animal tissues, structures, and functions. General concepts of biomechanics are complemented by the demonstration of mechanical analysis techniques (data collection, analysis, and interpretations). Fluid, soft tissue, hard tissue, and whole animal mechanics will be considered. The object of this class is to give students an understanding of the mechanics affecting morphology and performance, and to provide practical experience that will allow informed evaluation of research based on mechanical considerations.

[VTMED 606 Natural History and Ecology of an Estuary and Barrier Island]

Spring. Variable credit. Letter grades only. H.E. Evans.

This course is an on site experience of the flora and fauna of a natural barrier island and its surrounding waters off the coast of Georgia. This estuary serves as a nursery ground for commercial stocks of crustaceans and fishes and has been studied for 40 years. The freshwater ponds are populated by alligators, and diamond-backed rattlesnakes are present on the island, so care must be shown. Participants will live in a dormitory on the island and activities will include marsh, woodland and beach walks, shore seining and collecting, truck travel to other sites on the island, laboratory observations and dissections, and possibly a trawling trip. The course should serve as an introduction to marsh and estuary ecology and provide a first-hand understanding of the interdependence of the animals and plants that make up this ecosystem. There will be an opportunity to dissect fishes, and possibly an alligator, rattlesnake, turtle or bird.]

VTMED 607 The Literature of Natural History

Spring. 1 credit. Letter grades only. H.E. Evans.

This course is an introduction to the classic and current literature and bibliographic materials that relate to the biology and structure of zoo, laboratory, and aquarium animals from around the world. It will provide an opportunity to examine books, journals, and theses that pertain to animals from fish to primate. The approach will be phylogenetic with round-table discussions of available materials in a classroom or library. Information that is useful for investigations at the interface of biology and veterinary medicine will be emphasized.

VTMED 610 Veterinary Aspects of Avian Biology

Spring. 1 credit. Letter grades only. G.V. Kollias.

An introduction to the applied aspects of avian biology and management for veterinary students. The course will include lectures and laboratories involving avian evolution, anatomy, physiology, husbandry, and ecology. Emphasis will be on practical knowledge and hands-on experiences for students with interest in beginning to develop clinical skills with birds.

VTMED 611 Fish Health Management (also VETAV 631)

Spring. 1 credit. Veterinary students, or permission of instructor. Letter grades only. P.R. Bowser.

This course will present a summary of important diseases of fin fishes. Diseases covered will be those of importance in commercial aquaculture as well as those encountered by the tropical fish hobbyist. The course is designed to provide the students with a knowledge base and hands-on diagnostic experience in diseases of fish.

VTMED 612 Management of Aquarium Systems (also VETAV 630)

Spring. 1 credit. Veterinary students, or permission of instructor. Letter grades only. P.R. Bowser.

This is a lecture and laboratory course dealing with procedures and practices involved in management of aquarium systems. Topics to be covered include: water quality, types of aquarium filtration systems, fish health, fish nutrition, and general fish biology. A portion of the course will require independent work in aquarium system management.

[VTMED 630 Clinical Biostatistics for Journal Readers]

Spring, alternate years. 1-1.5 credits. Letter grades only. H.N. Erb, J.M. Scarlett, and others.

The student will become familiar with the statistical methods commonly used in veterinary clinical articles, and will be able to recognize obvious misuse of those methods.]

VTMED 632 Senior Seminar Distribution

Fall, spring. 1 credit. Letter grades only. Senior Seminar Committee.

Attendance at 14 of the senior seminar sessions presented during the academic year, and written report, constitutes acceptable completion of this course.

VTMED 633 Introduction to Non-traditional Companion and Laboratory Animals

Spring. 1 credit. Minimum 10 students; maximum 30 students. Letter grades only. J.E. Saidla (coordinator).

This course is a direct extension of *Animals, Veterinarians and Society Part A (Physical Examination)* and deals with a variety of non-traditional species commonly seen as companion and laboratory animals: rodents, lagomorphs, reptiles, amphibians, birds, goats, llamas, potbellied pigs and miniature horses. Initial portions of each session are devoted to instruction in restraint and handling, breeding, raising and general management of the species. This is followed by a laboratory exercise where techniques of restraint and physical examination are practiced.

VTMED 634 Introduction to Large Animal Ambulatory Practice

Fall, spring and summer. 1 credit. Letter grades only. M.E. White (coordinator).

This course introduces veterinary students to primary care large animal ambulatory practice and to herd health management through direct exposure to Large Animal Ambulatory Clinic Service of the Veterinary Medical Teaching Hospital. Students observe and assist with restraint, examination and routine treatment of animals, and communication with clients. Successful completion requires satisfactory participation during 5 days of clinical service, scheduled contiguously or separately.

VTMED 635 Introduction to the Professional Literature (also VETCS 601)

Spring. 1 credit. Letter grades only. D.F. Smith, H.N. Erb.

This course introduces veterinary students to the professional and biomedical literature, including development of critical reading skills. Students will become familiar with the broad range of professional and biomedical literature, and will be encouraged to develop a rigorous approach to journal and scientific article review. Secondary emphasis is on developing skills in library and bibliographic search techniques.

VTMED 636 Introduction to Dairy Management Systems

Spring. 1 credit. Minimum 5 students. Letter grades only. G.D. Mechor.

The course introduces veterinary students to the principles of dairy cow management, and provides a basis for advanced study in dairy herd production medicine. The course consists of a series of lectures followed by on-farm visits of dairy facilities to highlight the important production components of the dairy industry.

VTMED 637 Introduction to Community Practice Service

Fall, spring and summer. 1 credit. Letter grades only. W.E. Hornbuckle.

This course introduces veterinary students to primary care small animal clinical practice through direct exposure to the Community Practice Service of the Veterinary Medical Teaching Hospital. Students observe and assist with restraint, examination and routine treatment of pets, and communication with clients. Successful completion requires satisfactory participation during 10 half days of clinical service.

VTMED 660 20 Questions on ECM (Extracellular Matrix)

Spring. 1 credit. Letter grades only. R.R. Minor.

This course will explore the roles of ECM in embryonic development and tissue regeneration and repair.

VTMED 680 Behavior Problems of Horses (also VETPH 626)

Spring. 1 credit. Letter grades only. K.A. Houpt.

The goal of this course is to give veterinary students the ability to treat the behavior problems of horses. The most common problems are aggression, self-mutilation, stable vices, and foal rejection. History-taking, counseling, diagnostic tests, follow-up, and the importance of cooperation with the referring veterinarian will be presented. Methods of preventing behavior problems, training techniques of value to the practitioner, and socialization of foals will be presented using videotapes and demonstrations. The behavioral and pharmacological techniques used to treat behavior problems will be presented and the success of each evaluated. The students will be encouraged to develop techniques of their own based on an understanding of normal equine behavior.

VTMED 681 Behavior Problems of Small Animals (also VETPH 625)

Spring. 1 credit. Letter grades only. K.A. Houpt.

The goal of this course is to give veterinary students the ability to treat the behavior problems of cats and dogs. The most common problems are aggression and destructiveness in dogs and aggression and house soiling in cats. Other, less frequently encountered problems are insufficient or excessive sexual or maternal behavior, wool chewing, and hypervocalization in cats, and hyperactivity, phobias, and barking in dogs. History-taking, counseling, and follow-up methods will be presented. Each student will have the opportunity to participate in three cases. Cases will be treated in the clinic, during house calls, and via telephone consultations. The behavioral and pharmacological techniques used to treat behavior problems will be presented and the success of each evaluated.

VTMED 682 Acid Base Relations (also VETPH 627 and Biological Sciences 715)

Fall and spring. 2 credits. Prerequisites: previous exposure to renal and respiratory physiology, permission of instructor. Letter grades only. A. Dobson.

This course will provide a working knowledge of the principles of acid-base relations in sufficient depth to permit you to apply them confidently to clinical cases and to the acid-base literature. Approximately 30 hours of study in self instruction text is required. This course can be tailored to fit around other studies, and length of course is variable. Individual tutoring provided as required.

**Core and Selective Courses
(Classes of 1994-1996)**
Listed by department.

Anatomy

Cornelia E. Farnum, chair
D-206 Schurman Hall
607-253-3545

**VETA 505 and 506 Applied
Anatomy**

Fall (505), spring (506). 1 credit each term. Limited to third-year veterinary students. Letter grades only. A. de Lahunta.

This course provides an opportunity for practice in the recognition of the anatomical features that are essential to diagnostic, surgical, obstetrical, and postmortem procedures. The approach is topographical, comparative, and clinical. The emphasis is on the study of living animals, supplemented by dissections, models, and radiographs.

**VETA 600 Special Projects in
Anatomy (Selective)**

Fall and spring. 1 credit per 2.5 hour period. By permission of the instructor. S-U grades only.

**VETA 601 Research
Opportunities in Veterinary
Medicine (Selective)**

Fall, spring, summer, and January. 1-4 credits. By permission of the instructor. S-U grades only.

An independent-study course. Students work closely with individual faculty members in their research laboratories.

**[VETA 602 Advanced Clinical
Neurology (Selective)]**

Spring. 1 credit. Prerequisite: first two semesters of veterinary curriculum. S-U grades only. A. de Lahunta.

Correlation of anatomy, physiology, and pathology in the diagnosis and treatment of diseases of the nervous system and an understanding of their pathogenesis. Case demonstrations are emphasized.]

**VETA 603 Gross Anatomy of
the Cat (Selective)**

2 credits. Limited to second- and third-year veterinary students. Maximum enrollment: 8. Letter grades only. C.E. Farnum.

The purpose of this course is to study the gross anatomy of the domestic cat. The course will be taught in a small group, tutorial format. During the course of the semester, there will be two cases. Each will be developed over a four-week period. In addition to the tutorials, pairs of students will dissect a perfused cadaver.

**VETA 604 Biomechanics:
Concepts and Techniques
(Selective) (also VTMED 605)**

Spring. 2 credits. J.E.A. Bertram.
See description for VTMED 605.

**Avian and Aquatic Animal
Medicine**

Bruce W. Calnek, chair
P. Philip Levine Laboratory
607-253-3365

**VETAV 255 Poultry Hygiene
and Disease (also Animal
Science 332)**

Fall, odd-numbered years. 2 credits. Minimum enrollment: 6. Maximum enrollment: 16. Prerequisites: MICRO 290 and permission of the instructor. Letter grades only. B. Lucio-Martinez.

A combination of lecture, discussion, laboratory and literature search exercises. Focuses include poultry industry structure and management practices and their effect on poultry health. Selected diseases are used to discuss control through eradication and/or immunization. Includes laboratory demonstration/exercises on anatomy and on bleeding, euthanasia, and necropsy techniques.

VETAV 555 Avian Diseases

Fall. 2 credits. Limited to third-year veterinary students. Letter grades only. S. A. Naqi.

A clinically oriented course that starts with restraint and dietary

requirements of pet birds, then focuses on presentation, diagnosis, and treatment of common pet bird diseases. A laboratory session uses budgerigars to illustrate the fundamentals of restraint and physical examination of pet birds.

Poultry disease presentations focus on the etiology, pathogenesis, diagnosis, and control of some of the common diseases of domestic and commercial poultry. Consequences of stress and immunologic impairment for the disease process are discussed. Basic concepts of epidemiology and preventive medicine in relation to current disease control practices in the poultry industry are emphasized. Laboratory sessions address handling and restraint of birds, bleeding techniques, euthanasia, and necropsy procedures.

**VETAV 614 Research
Opportunities in Veterinary
Medicine (Selective)**

By arrangement with instructor. 1-4 credits. Veterinary students; others by permission of the instructor. S-U grades. K. A. Schat.

An independent-study course. Students work closely with individual faculty members in their research laboratories.

**VETAV 630 Diseases of
Aquarium Fishes (Selective)
(also VTMED 612)**

Spring, even-numbered years. 1 credit. Minimum enrollment: 8. Maximum enrollment: 16. Veterinary students; others by permission of the instructor. S-U grades. P. R. Bowser.

See description for VTMED 612.

**VETAV 631 Fish Health
Management (Selective) (also
VTMED 611)**

Spring. 1 credit. Minimum enrollment: 8. Maximum enrollment: 16. Veterinary students; others by permission of the instructor. S-U grades. P.R. Bowser.

See description for VTMED 611.

[VETAV 663 Veterinary Medicine in Developing Nations (Selective)]

Spring, even-numbered years. 2 credits. Maximum enrollment 20 students. Primarily for veterinary students. Others by permission of the instructor. S-U grades. K. A. Schat.

This lecture and discussion course gives students a broader insight into the many problems important for lesser-developed nations. Special emphasis is placed on non-veterinary aspects related to the development of those countries, such as sociological and economic interactions, the transfer of technology, and the role of women. Final selection of the topics depends on the availability and expertise of participating faculty. Active participation of students is encouraged.]

VETAV 672 Aquavet I: Introduction to Aquatic Veterinary Medicine (Selective)

Four weeks of full-time instruction at Woods Hole, Massachusetts, immediately after the spring term. 4 credits. Maximum enrollment 24 students from Cornell University, the University of Pennsylvania, and other U.S. colleges and schools of veterinary medicine. By permission of the instructor. S-U grades. P. R. Bowser.

The course is sponsored by Cornell University, the University of Pennsylvania, and three marine science institutions at Woods Hole: the Marine Biological Laboratory, the Woods Hole Oceanographic Institution, and the Northeast Center of the National Marine Fisheries Service. It is designed to introduce veterinary students aquatic animal medicine. The marine environment is described and visited on field trips in the Woods Hole area. Specific aspects of the comparative anatomy, physiology, nutrition, microbiology,

pathology, and medicine of a variety of marine and freshwater species are discussed. Some emphasis is placed on systems of aquaculture. The specific diseases of a few selected species are presented as examples, including the diseases of a crustacean, a shellfish, a finfish, and marine mammals. The course is taught by an invited faculty of 33 individuals who are leaders in their respective fields of aquatic animal medicine. Students present seminars on appropriate topics.

VETAV 673 Aquavet II: Comparative Pathology of Aquatic Animals (Selective)

Two weeks of full-time instruction at Woods Hole, Massachusetts, immediately after the spring term. 2 credits. Maximum enrollment, 18 students. Prerequisites: formal course work in diseases of aquatic animals or appropriate experience and permission of the instructor. S-U grades. P.R. Bowser.

This course is sponsored by Cornell University, the University of Pennsylvania, and three marine science institutes at Woods Hole: the Marine Biological Laboratory, the Woods Hole Oceanographic Institution, and the Northeast Center of the National Marine Fisheries Service. It is an advanced course in the comparative pathology of aquatic invertebrates and vertebrates commonly used as laboratory animals. The material presented will consist of discussions of the diseases of aquatic animals as well as extensive use of the microscope to examine the histopathology associated with these diseases. The course is taught by an invited faculty of 12 individuals who are leaders in their respective fields of aquatic animal medicine.

VETAV 770 Advanced Work in Avian Diseases (Graduate)

Fall and spring. Credit to be arranged. By special arrangement with the instructor. Letter grades only. S. A. Naqi.

VETAV 772 Advanced Work in Aquatic Animal Diseases (Graduate)

Fall and spring. Credit to be arranged. By special arrangement with the instructor. S-U grades only. P.R. Bowser.

VETAV 773 Advanced Work in Avian Immunology (Graduate)

Fall and spring. Credit to be arranged. By special arrangement with the instructor. Letter grades only. K. A. Schat.

Clinical Sciences

Brian R.H. Farrow, chair
427 Veterinary Research Tower
607-253-3570

VETCS 520 Preventive Medicine in Animal Health Management

Spring. 1 credit. Required of all third-year veterinary students. Graduate and animal science students by permission of the instructor. Letter grades only. H. N. Erb (coordinator); Y. T. Grohn; and guest lecturers.

Topics include introductory lectures on cost-benefit analysis, ventilation and other aspects of safe animal housing, and genetics. A few lectures deal with species-specific herd health programs (e.g., setting up a dairy herd health program, working with dog or cat breeders or humane shelters). The emphasis in these lectures is on methods and problems in setting up programs, record keeping, decisions on what to include, and the difference between preventive programs and sporadic diagnostic and therapeutic practice.

VETCS 545 Clinical Epidemiology

Fall. 2 credits. Required of all second-year veterinary students. Others by permission of the instructor. Letter grades only. J. M. Scarlett (coordinator).

This course reviews the basic concepts of infectious and chronic disease epidemiology. Descriptive, analytic, and experimental study designs are covered, as well as evaluation of diagnostic and screening tests, data quality, and ethical considerations in biomedical research. In addition, the application of epidemiologic methods to the investigation of disease outbreaks is discussed.

VETCS 547 Practice Management (Selective)

Fall, spring, and summer. 2 credits. Intended for fourth-year veterinary students. S-U grades only. J.E. Saidla.

This course is designed to provide an introduction to the entire topic of practice, facility and people management. Course participants form a veterinary group practice which includes the specialties of each person's interest. Topics will be presented and discussed in the staff meeting format of the practice. Topics covered include practice organization, leadership, career planning, communication skills, facility management, human resource management, maintenance of standards, marketing and merchandising, building and maintaining clients, practice growth, finances, computing systems and information management, money management, legal issues and insurance, professional relations and responsibility, and maintaining an acceptable quality of life. Three area veterinary practices are visited and reviewed by the group as examples of good practice management.

VETCS 548 Anesthesiology

Fall. 1 credit. Required of all third-year veterinary students. Not open to students of other colleges. Letter grades only. J.W. Ludders; R.D. Gleed (coordinator); C.E. Short; P.F. Moon.

The basic principles of anesthesiology are discussed, including premedication, injectable anesthesia, inhalant anesthesia, and control of pain. Special emphasis on the information necessary to choose a rational anesthetic technique for patients with common problems. Specific areas covered include fluid administration in the peri-anesthetic period, postoperative care, patient-monitoring techniques, and cardiopulmonary resuscitation. Students are assumed to understand the basics of pharmacokinetics, pharmacodynamics, cardiovascular function, and respiratory gas exchange.

VETCS 561 Theriogenology I

Spring. 3 credits. Required of all second-year veterinary students. Not open to others. Letter grades only. Fee, \$15. B.A. Ball; P.F. Daels; R.O. Gilbert (coordinator); R.B. Hillman; V.N. Meyers-Wallen.

A presentation of applied physiology and endocrinology of the male and female reproductive tract using the bovine model. Management practices utilized to ensure maximum reproductive efficiency are discussed. Diagnosis, treatment and prevention of congenital, infectious, and endocrine diseases affecting the genital organs are covered. The technique, advantages and risks involved in artificial insemination are detailed. Hands-on laboratory experience is provided for learning rectal examination of the genital organs in cattle and horses. Reproductive tracts recovered from the slaughterhouse are used to illustrate and correlate the stage of the estrus cycle with ovarian and uterine changes as well as provide demon-

strations of many of the pathologic conditions of the genital organs. Laboratory sessions also provide experience in breeding soundness evaluation in bulls and stallions.

VETCS 562 Theriogenology II

Fall. 3 credits. Required of all third-year veterinary students. Not open to others. Letter grades only. Fee, \$15. B.A. Ball (coordinator); P.F. Daels; R.O. Gilbert; R.B. Hillman; V.N. Meyers-Wallen.

Applied physiology and endocrinology in the canine, feline, equine and porcine species are covered. Management practices to ensure maximum reproductive efficiency are discussed for each species. Laboratory exercises include continuation of training in rectal examinations as well as hands-on experience in obstetrical manipulation and fetotomy techniques, practice in determination of the stage of the estrus cycle in bitches by vaginal cytology, and breeding soundness evaluation of mares.

VETCS 563 Large Animal Medicine and Surgery

Fall. 5 credits. Limited to third-year veterinary students. Letter grades only. Faculty of medicine and surgery sections; W. C. Rebhun (coordinator).

This is a team-taught lecture course that is designed to impart a general knowledge of the principles of diagnosis and treatment of medical and surgical diseases of large domestic animals. Major emphasis is on cattle and horses, but some lectures are devoted to swine and small ruminants. Important medical and surgical diseases of all major body systems are discussed as well as metabolic disorders and those associated with various toxicities and poisonous plants. Several lectures address the diagnosis and treatment of various lamenesses in large animals.

VETCS 564 Large Animal Medicine and Surgery

Spring. 6 credits. Limited to third-year veterinary students. Letter grades only. Faculty of medicine and surgery sections; W.C. Rebhun (coordinator).

A continuation of lectures designed to impart a general knowledge of the principles of diagnosis and treatment of medical and surgical diseases of large domestic animals.

VETCS 566 Radiographic Techniques

Fall, two weeks. 1 credit. Required of all third-year veterinary students. Others with appropriate background by permission of the instructor. N.L. Dykes (coordinator); V. T. Rendano.

An introductory course designed to familiarize the student with both the production of radiographs and their interpretation. Topics covered include radiographic equipment, x-ray generation and radiation safety. A systematic approach to the radiographic evaluation of small, large, and exotic species is presented as well as basic principles of diagnostic ultrasound, nuclear medicine and radiation therapy.

VETCS 567 Clinical Nutrition

Fall. 2 credits. Required of all third-year veterinary students. Others by permission of the instructor. Letter grades only. F. A. Kallfelz and A. Reynolds.

The first third of this course is devoted to a review of basic principles of nutrition and specific nutritional requirements of both companion and farm animals. Students are given an introduction to ration evaluation and formulation of rations for normal animals. Computerized approaches to ration evaluation and formulation are demonstrated. In addition, the special nutritional needs of new-

born and growing animals; special nutrient requirements for work, production, and reproduction; and nutritional considerations for older animals are considered. The second two-thirds of this course covers clinical nutrition. Nutritionally induced diseases due to nutrient deficiencies and excesses as well as metabolic diseases are considered. Dietary management of nutritionally induced, degenerative, and other diseases is stressed. Case material from the Teaching Hospital is used as appropriate to demonstrate these principles.

VETCS 570 Theriogenology Service (Selective)

Spring. 2 or 4 credits. Limited to fourth-year veterinary students. Letter grades only. B. A. Ball; P.F. Daels; R. O. Gilbert; R. B. Hillman (coordinator); V. N. Meyers-Wallen.

A selective clinical service rotation, this course is offered to provide additional hands-on experience in all phases of theriogenology. Equine reproductive experience is gained in teasing, rectal palpations, ultrasound scanning, semen collection and evaluation, natural breeding, and artificial insemination. Additional techniques emphasized include taking and evaluation of endometrial biopsies, endometrial culturing, and collection and evaluation of endometrial cytology smears. Bovine experience includes weekly trips to the slaughterhouse, where rectal-palpation findings can be compared to actual structures present in recovered tracts. Additional experience in rectal palpation is gained by following cyclic changes in assigned cows in the college dairy herd as well as by participating in herd-health palpations. Hands-on experience is provided in superovulation and embryo-recovery techniques, as well as in surgical deviation of the penis to provide teaser bulls. Trips to the Department of Animal Sci-

ence sheep and swine barns allow observation of breeding programs and provide experience in castration, docking, clipping milk teeth, notching ears, etc. Weekly seminars are presented on current topics in theriogenology.

VETCS 572 Senior Seminar

Fall and spring. 1 credit. Required of all fourth-year veterinary students. First-, second-, and third-year students and all staff members are also invited and encouraged to attend. S-U grades only. F. H. Fox, chair of the Senior Seminar Committee.

The aim of this course is to give the student the responsibility and opportunity of selecting and studying disease entity on the basis of a case or series of cases or to give the student the responsibility and opportunity of conducting a short-term, clinically oriented research project under the direction of a faculty member. In either case, an oral report will be presented at a weekly seminar. A written report will also be submitted at the time of the seminar. All participants are encouraged to foster an atmosphere in which discussion, exchange of ideas, and the airing of controversial opinions might flourish.

VETCS 574 Large Animal Surgery Service

Fall, spring, and summer. 4 credits. Limited to fourth-year veterinary students. Letter grades only. R.P. Hackett and others.

This clinical rotation is structured to provide supervised clinical experience in the practice of large animal surgery. Under the direction of faculty and house staff, students participate in the diagnosis, surgical treatment, and care of patients presented to the Large Animal Clinic. Training through patient care is supplemented by formal rounds and by didactic instruction.

VETCS 575 Ambulatory Service

Fall, spring, and summer. 4 credits. Required of all fourth-year veterinary students. Not open to students from other colleges. Letter grades only. F. H. Fox; C. L. Guard (coordinator); G. D. Mechor; M. C. Smith; M. E. White.

A clinical service rotation in which students accompany ambulatory clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large animal clients. Routine herd health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), nutritional evaluation, and disease prevention are stressed. Herd health programs also include vaccinations, parasite control, mastitis prevention, and routine procedures such as castration and dehorning. With appropriate herds, analysis of computerized performance data is conducted and discussed with the owner. In addition to assisting with routine scheduled work, students participate in diagnosis and medical or surgical treatment of ill or injured animals. This includes rotating assignments for night and weekend duty.

VETCS 578 Clinical Anesthesiology

Fall, spring, and summer. 3 credits. Limited to fourth-year veterinary students. Letter grades only. R.D. Gleed (coordinator), J.W. Ludders and P.F. Moon.

This course is designed to provide clinical experience in the use of anesthetics in both small companion animals, horses, and some food animals. The students participate in the process of selecting suitable anesthetic techniques for cases in the Veterinary Medical Teaching Hospital and

then implement those techniques under the supervision of residents and faculty. The goal is that students learn the skills necessary to perform safe anesthesia in a modern veterinary practice.

VETCS 579 General Medicine and Surgery

Spring. 4 credits. Required of all second-year veterinary students. Prerequisite VETPA 536. Letter grades only. T.J. Divers and W.E. Hornbuckle (coordinators), with H.J. Harvey and other faculty.

An introduction to veterinary internal medicine and surgery. Emphasis is placed on the comparative and pathophysiologic aspects of disease, the clinical manifestations of organ system dysfunction, the principles of aseptic surgical technique, the healing of incised and traumatic wounds, and the prevention and treatment of surgical complications. This course is designed to provide an introduction to the basic concept of medicine and surgery. Emphasis is placed on history-taking, clinical signs associated with particular disorders of each body system; and on problem-oriented diagnosis. The pathophysiological mechanisms causing the clinical signs will be presented. The course will provide some integration of diagnostic testing to complement the clinical signs. The laboratories that accompany the lectures in the course are intended to provide an in-depth examination of each body system and demonstrate basic skills necessary for the practice of surgery.

VETCS 580 Radiology Service

Fall, spring, and summer. 2 credits. Required of all fourth-year veterinary students. Not open to others. Letter grades only. N.L. Dykes (coordinator); V.T. Rendano.

A two-week clinical rotation in the Radiology Section of the Veterinary Medical Teaching Hospital. Students will be exposed to radiology, ultrasound, and nuclear medicine imaging techniques used in evaluation of animal patients in the Veterinary Medical Teaching Hospital. Under guidance of radiology faculty and technical staff, students obtain and interpret radiographic and ultrasonographic studies. Two three-hour laboratory sessions are given to allow hands-on experience in patient positioning and radiographic technique. An autotutorial teaching film file is used to familiarize students with radiographic examples of common diseases of large and small animal species. Small-group discussions are scheduled to present and discuss current cases. Radiation safety aspects regarding the veterinary practitioner are emphasized.

VETCS 582 Large Animal Surgical Exercises

Spring. 2 credits. Required of all third-year veterinary students. Not open to others. S-U grades only. S. L. Fubini (coordinator) and other large animal surgery and anesthesiology faculty.

This practical course is designed to impart fundamental skills in preoperative and postoperative care, anesthesia, aseptic technique, instrument and tissue handling, and surgical skills by closely supervised operations on large domestic animals and cadaver specimens.

VETCS 583 Small Animal Medicine and Surgery

Fall. 5 credits. Required of all third-year veterinary students. Not open to others. Prerequisites: VETPA 536, VETPA 571, and VETPR 528. Letter grades only. Faculty of medicine and surgery sections;

A lecture format is used to present the major medical and surgical diseases of dogs and cats. The course material is divided into organ system blocks and includes ophthalmology, cardiology, urogenital medicine and surgery, gastrointestinal medicine and surgery, musculoskeletal diseases and surgery, neurosurgery, endocrinology and endocrine surgery, dermatology, respiratory medicine and surgery. Emphasis is placed on diagnosis (clinical signs, laboratory findings) and treatment. This course is continuous with VETCS 584 in the spring.

VETCS 584 Small Animal Medicine and Surgery

Spring. 7 credits. Limited to third-year veterinary students. Letter grades only. Faculty of medicine and surgery sections; E.J. Trotter (coordinator).

A continuation of VETCS 583.

VETCS 586 Small Animal Surgical Exercises

Spring. 2 credits. Limited to third-year veterinary students. S-U grades only. H.J. Harvey and other small animal surgery and anesthesiology faculty.

This course provides the opportunity for students to practice basic surgical skills. Three chosen core procedures (celiotomy, ophthalmology surgery, orthopedic approach) encompass maneuvers with widespread application to many types of surgery. The schedule is constructed so that each student will be the primary surgeon for each core exercise.

VETCS 589 Small Animal Medicine and Community Practice Services

Fall, spring, and summer. 6 credits. Required of all fourth-year veterinary students. Not open to others. Letter grades only. S.C. Barr; S.A. Center; W.J. Gould; W.E. Hornbuckle; N.S. Moise; J.A. Randolph (coordinator).

Two medical services and a community practice service. The Small Animal Medicine and Community Practice Services are structured to provide supervised clinical experience in the practice of small companion-animal medicine. The course is conducted in the Small Animal Clinic of the Veterinary Medical Teaching Hospital. Students interact directly with clients presenting their pets for primary or referral medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients. After review, students explain their plans to the clients and provide follow-up care and management of these patients.

VETCS 591 Small Animal Surgery Service

Fall, spring, and summer. 4 credits. Required of all fourth-year veterinary students. Not open to others. Letter grades only. H.J. Harvey (coordinator) and small animal surgery faculty.

A clinical service rotation, this course exposes the student to the practice of surgery under hospital conditions. Students participate in the diagnostic techniques, the planning of therapy, and the daily care of dogs, cats, and exotic species under the direction of a faculty veterinarian. Students assist experienced surgeons in the operating room and, with house-officer supervision, are

responsible for patients undergoing elective ovariohysterectomy or castration. Client communications and the basics of efficient practice are also emphasized.

VETCS 593 Ophthalmology Service

Fall, spring, and summer. 2 credits. Required of all fourth-year students. Limited to veterinary students. Letter grades only. T.J. Kern; R. C. Riis; M.M. Taylor.

This course combines clinical experience with beginning skills in diagnostic ophthalmology. Students learn how to apply the ophthalmic diagnostic tests. The feeling of performing a good ocular examination is the goal of this rotation. Confidence in using direct and indirect ophthalmoscopes, slit lamps, tonometers, gonioscopes, conjunctival cytology, and surgery comes with practice introduced in this rotation. The first week requires an introductory orientation tape in the Autotutorial Center. Every morning, this rotation includes a surgical procedure, and every afternoon is scheduled with consultations. A high percentage of the consultations are referral cases that usually challenge the service. Adequate routine case material is presented to prepare most senior students for practice.

VETCS 594 Large Animal Medicine Service

Fall, spring, and summer. 3 credits. Required of all fourth-year veterinary students. Not open to students of other colleges. Letter grades only. W. C. Rebhun (coordinator) and other large animal medicine faculty.

This clinical rotation provides a variety of interesting equine and bovine medical cases that will allow students to apply their diagnostic and therapeutic knowledge. In the process, students will be able to acquire the history and select and perform diagnostic tests

CS 604 = Cardiology

and therapeutics under the direction of the house staff and faculty. There is also opportunity for client interaction. During daily ward rounds, differential diagnosis and pathophysiology and treatments of each case are discussed. During small-group rounds, common diseases of horses and cattle and commonly used diagnostic procedures are reviewed.

VETCS 596 Opportunities in Veterinary Medicine

Fall, spring, and summer. Variable credits. S-U grades only. D.F. Smith (coordinator).

This course provides opportunities for students after the end of the third year to explore professional areas not available through the regular curriculum. Blocks of two to four weeks are usually spent at other teaching hospitals, research laboratories, or zoological facilities. Student proposals are submitted to the associate dean for veterinary education for review and approval. On-site supervisors of the block act as ex-officio faculty members and are required to formally evaluate each student.

VETCS 598 Dermatology Service

Fall, spring, and summer. 2 credits. Required of all fourth-year veterinary students. Not open to others. Letter grades only. W.H. Miller, Jr. and D.W. Scott.

During this clinical rotation, students participate in the diagnosis and management of skin disorders in small and large animals. Patients are examined by appointment and through consultation with other hospital services.

VETCS 601 Dentistry (Selective)

Fall and spring. 1 credit. Open to all second- and third-year veterinary students. Every Friday afternoon during the semester. Due to limited laboratory space and equipment, half of the class meet on an alternating basis from 1:15 to 3:15 or from 3:15 to 5:15. S-U grades only. J.E. Saidla.

This course introduces students to the entire field of small animal dentistry. Basic concepts and practical topics in nomenclature, dental anatomy, oral/dental examination, record keeping, occlusion/malocclusion, periodontics, endodontics, restorative dentistry, and orthodontics will be presented. Basic instrumentation and materials used in dentistry will be stressed. The course is taught using the case-based format. Most sessions begin with the 'case of the day' followed by 30 minutes of mini-lecture, demonstration and videotapes and 90 minutes of laboratory where you will gain hands on experience. Students will work in groups of two so that everyone can gain the same technical aspects of instrumentation and develop the manipulative skills necessary to perform basic dental procedures. Canine and feline skulls or heads will be used in all sessions.

VETCS 603 Reproductive Examination of the Mare (Selective)

Fall. 1 credit. Limited to third year veterinary students. Maximum enrollment, 24 students. S-U grades only. P.F. Daels. Students will meet 1.5 hours a week for eight weeks.

The genital tract of non-pregnant and pregnant mares are examined per rectum. Findings will be discussed in light of the animal's reproductive status. Each week, a hypothetical case is presented to students and discussed

during the course of the laboratory. Current class material from the core course (VETCS 562-Theriogenology II) and its application to animals in the herd will be discussed. Students are also introduced to the use and interpretation of ultrasonography during the final session.

VETCS 616 Research Opportunities in Veterinary Medicine (Selective)

Fall, spring, summer, and January. 1-4 credits. By permission of the instructor. S-U grades optional. An independent-study course.

Students work closely with individual faculty members in their research laboratories.

VETCS 664 Introduction to Epidemiology (Graduate)

Fall. 3 credits. Prerequisites: Statistics and Biometry 601 (College of Agriculture and Life Sciences) may be taken concurrently. S-U grades optional. H.N. Erb.

Lectures and discussion deal with the fundamentals of epidemiology. Current topics in epidemiology from the fields of nutrition, infectious and chronic diseases, occupational medicine, and veterinary medicine will be reviewed to illustrate the principles and practice of epidemiology, especially of clinical trial design and infectious disease epidemiology.

VETCS 665 Study Designs (Graduate)

Spring. 2 credits. Prerequisites: VETCS 664 and Statistics and Biometry 601 (College of Agriculture and Life Sciences). S-U grades optional. H.O. Mohammed.

Design and interpretation of cross-sectional, case-control, and cohort studies (including controlled clinical trial) are covered. Design issues will include sample size, bias, and relative advantages and disadvantages.

VETCS 666 Advanced Methods in Epidemiology (Graduate)

Fall. 3 credits. Prerequisites: VETCS 665 and Statistics and Biometry 602 (College of Agriculture and Life Sciences). S-U grades optional. Y.T. Grohn.

Concepts introduced in VETCS 664 and VETCS 665 are further developed, with emphasis on statistical methods. Topics include interaction, effect modification, stratified analysis, matching and multivariate (logistic regression) methods, survival analysis, and strategies for the analysis of epidemiologic data.

VETCS 675 Special Problems in Large Animal Medicine (Selective)

Fall and spring. Credit to be arranged. Limited to veterinary students. By permission of the instructor.

VETCS 676 Special Problems in Large Animal Surgery (Selective)

Fall and spring. Credit to be arranged. Limited to veterinary students. By permission of the instructor.

VETCS 677 Special Problems in Theriogenology (Selective)

Fall and spring. Credit to be arranged. Limited to veterinary students. By permission of the instructor. Theriogenology faculty.

VETCS 678 Fundamental Techniques in Bovine Embryo Transfer (Selective)

Spring. 1 credit. Limited to third- and fourth-year veterinary students. S-U grades only. R. B. Hillman.

The major emphasis of this course is on bovine embryo transfer, but information is also provided on equine, ovine and caprine embryo transfer. Freezing and micromanipulation are also considered. Some of the class work is in the laboratory.

VETCS 679 Dairy Herd Management and Health

Fall. 2 credits. Intended for third- and fourth-year veterinary students. Maximum enrollment, 20 students. S-U grades only. C.L. Guard.

This course covers areas of dairy herd management in the context of production efficiency and the role of the veterinarian as management consultant. Major subject areas will include nutrition, mastitis, reproduction, and herd-replacement raising. Means of evaluating performance in those key areas are stressed. Other related topics include relevant data acquisition and analysis, a survey of housing and feeding facilities, and milking-equipment designs and troubleshooting.

VETCS 680 Poisonous Plants (Selective)

Fall. 1 credit. Students from other colleges by permission of the instructor. S-U grades only. R. B. Hillman and M. C. Smith (coordinator).

Field trips demonstrate toxic plants growing in natural or cultivated settings. Lectures address economically important poisonous plants native to the United States. Information presented includes plant identification, natural habitat, toxic principles, clinical signs of toxicity, and treatment and prevention of poisoning in animals. Some of the major toxic principles found in plants and considered in detail in the course are nitrates, cyanide, oxalates, photodynamic agents, alkaloids, and mycotoxins.

[VETCS 681 Horse Health Management

Spring, odd-numbered years. 1 credit. Intended for third- and fourth-year veterinary students. S-U grades only. C.A. Collyer, R. B. Hillman (coordinator).

Prevention of equine diseases by management practices, nutrition,

and vaccination procedures is emphasized. The reproductive aspects of a breeding farm are detailed, starting with the need for complete health records and including the normal reproductive cycle, detection of estrus, breeding techniques, use of lighting programs and hormones, stallion fertility and artificial insemination. Diagnosis, treatment, and management of problem mares are included. Pregnancy determination and care of the pregnant mare are covered, as are natural and induced parturitions. Care of the newborn foal and diagnosis, treatment, and prevention of foal diseases are also included.]

VETCS 684 Horse Lameness (Selective)

Spring. 1 credit. Limited to third-year veterinary students. S-U grades only. N.G. Ducharme (coordinator) and A.J. Nixon.

This course is designed to acquaint third-year students with the advanced equine lameness problem. The course consists of lectures and laboratories stressing lameness as it can be evaluated in private practice. Laboratory session stresses local anesthesia, ultrasound, and radiographic techniques.

[VETCS 686 Goats: Management and Diseases (Selective)

Spring. 1 credit. Intended for second-, third-, and fourth-year veterinary students. S-U grades only. M. C. Smith.

Infectious, parasitic, nutritional, and toxic diseases of goats are considered. Appropriate herd-health programs to prevent or control these conditions are outlined. Procedures demonstrated or discussed include anesthesia, dehorning, castration, tattooing, foot care, and various obstetrical manipulations. Physiology, nutrition, and management are considered as they pertain to maintaining health and productivity of the goats.]

VETCS 688 Special Problems in Small Animal Medicine (Selective)

Fall and spring. Credit to be arranged. Limited to veterinary students. By permission of the instructor. Medicine faculty.

VETCS 689 Special Problems in Small Animal Surgery (Selective)

Fall and spring. Credit to be arranged. Limited to fourth-year veterinary students. By permission of the instructor. Surgery faculty

VETCS 690 Veterinary Dermatology (Selective)

Spring. 1 credit. Limited to third- and fourth-year veterinary students. Minimum enrollment, 10 students. S-U grades only. W.H. Miller, Jr. and D.W. Scott.

This course emphasizes dermatologic conditions of small and large animals not covered in the core curriculum. Course grade is based on a final examination.

VETCS 694 Avian and Reptile Medicine and Surgery

Spring, even-numbered years. 1 credit. Intended for second-, third-, and fourth-year veterinary students; others by permission of the instructor. G.V. Kollias

The avian component of the course will be a continuation of avian diseases covering specialized topics in companion bird and aviary medicine. The reptile component of the course will provide an introduction to reptile medicine and surgery.

VETCS 695 Advanced Equine Surgical Techniques (Selective)

Spring. 1 credit. Limited to third-year veterinary students. S-U grades only. S.L. Fubini (coordinator) and other large animal surgeons.

This course consists of four laboratories performing advanced surgical procedures on ponies and cadaver specimens. Procedures in this laboratory are performed primarily at referral surgical centers. It is the intent of this course not to make the students proficient in these procedures, but to familiarize them with some specialized surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for those students anticipating equine practice after graduation. This course is offered the last four weeks of the spring semester, following the VETCS 582.

VETCS 696 Basic and Therapeutic Horseshoeing (Selective)

Spring. 1 credit. Limited to veterinary students. S-U grades only. M.J. Wildenstein.

This course covers what veterinarians need to know about horseshoeing. Students receive hands-on training in pulling shoes and trimming the equine hoof. Basic hoof care, shoeing, and shoe types will be discussed. Problems of the hoof that are best treated by a cooperative effort between farrier and veterinarian—such as laminitis, navicular, and foal limb deformities—will be discussed in length. This course gives a solid introduction to farriery—a must for those considering a career with horses.

VETCS 697 Advanced Techniques in Food Animal Surgery (Selective)

Spring. 1 credit. Limited to third year veterinary students. S-U grades only. S.L. Fubini (coordinator) and other large animal surgeons.

This course consists of four laboratories performing advanced surgical procedures on small ruminants, cadaver specimens, and adult cattle. Procedures in this

laboratory are performed primarily at referral surgical centers. It is the intent of this course not to make the students proficient in these procedures, but to familiarize them with some specialized surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for those students anticipating food animal practice after graduation. This course is offered the last four weeks of spring semester, following VETCS 582.

VETCS 698 Senior Seminar Selective

Fall and spring. 1 credit. First-, second-, and third-year veterinary students or by permission of instructor. S-U grades only.

Attendance at 14 of the senior seminar sessions presented during the academic year constitutes acceptable completion of this course.

VETCS 699 Llama Tutorial (Selective)

Fall and spring. 1 credit. Limited to third- and fourth-year veterinary students. S-U grades only. M.C. Smith.

This autotutorial or group tutorial course covers common problems of llamas and alpacas. Each week, participants will be provided with a brief case description and a set of sample study questions. Reference will be made to textbooks, journal articles, videotapes, and (if available) a teaching llama to assist students in finding the answers to the questions efficiently. Grading is based on an oral exam.

[VETCS 700 Pathophysiology of Gastrointestinal Surgery (Graduate)]

Fall, every third year. 1.5 credits. S-U grades only.]

[VETCS 701 Pathophysiology of Orthopedic Surgery (Graduate)]

Spring, every third year. 1.5 credits. S-U grades only.]

VETCS 702 Pathophysiology of Cardiopulmonary Surgery (Graduate)

Fall, every third year. 1.5 credits. S-U grades only.

VETCS 703 Surgical Principles and Surgery of the Integumentary System (Graduate)

Spring, every third year. 1.5 credits. S-U grades only.

[VETCS 704 Pathophysiology of Urogenital Surgery (Graduate)]

Fall, every third year. 1.5 credits. S-U grades only.]

[VETCS 705 Animal Pain and Its Control (Graduate)]

Spring, odd-numbered years. 2 credits. By permission of the instructor. C.E. Short.

This course provides residents and graduate students with fundamental and applied concepts of animal pain, the cerebral and cardiopulmonary responses to pain, and medications used for its control. The subject material will be covered both by lectures and by group discussion sessions.]

[VETCS 706 Pathophysiology of Neurologic Surgery (Graduate)]

Spring, every third year. 1.5 credits. S-U grades only.]

VETCS 707 Clinical Biostatistics (Graduate)

Spring, alternate years. 2 credits. Letter grade only. H.N. Erb; Y.T. Grohn; H.O. Mohammed; J.M. Scarlett (coordinator).

The theory behind and interpretation of parametric and non-parametric statistical techniques commonly employed in clinical

medicine will be explained. Students will analyze small data sets using a commercial statistical software package.

VETCS 708 Epidemiology Seminar Series (Graduate)

Fall and spring. 1 credit. S-U grades only. Epidemiology faculty.

Advanced theoretical and analytical epidemiologic concepts and techniques will be discussed.

VETCS 766 Graduate Research (Graduate)

Fall, spring, and summer. Credit and hours to be arranged. By permission of the graduate faculty member concerned. S-U grades only. Epidemiology faculty.

VETCS 768 Master's-Level Thesis Research (Graduate)

Fall or spring. 1-6 credits. Epidemiology faculty.

This course enables graduate students in the Section of Epidemiology to receive graduate research credits for master's-level thesis research.

VETCS 769 Doctoral-Level Thesis Research (Graduate)

Fall or spring. 1-6 credits. Epidemiology faculty.

This course enables students in the Section of Epidemiology to receive graduate research credits for doctoral-level thesis research.

VETCS 799 Independent Studies in Epidemiology (Selective)

Fall and spring. 1 to 3 credits. H. N. Erb, Y. T. Grohn, H. O. Mohammed, J. M. Scarlett.

The purpose of this course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem definition, research design, and the analysis of epidemiologic data.

Diagnostic Laboratory

Donald H. Lein, director
206 Diagnostic Laboratory
607-253-3900

VETDL 531 Regulatory Medicine

Spring. No credit. Required of all third-year veterinary students. S-U grades only.

A review of animal and poultry diseases that are reportable to the New York State Department of Agriculture and Markets in preparation for taking the USDA accreditation examination.

VETDL 611 Mastitis (Selective)

January, 6-8 hours per day for three weeks. 3 credits. Limited to third-year veterinary students. Letter grades only. P. M. Sears and staff.

This course covers the causes, diagnosis, treatment, and prevention of bovine mastitis. The role of management practices is stressed. The course includes lectures, readings, discussions, laboratory exercises, and farm visits as part of the New York State Quality Milk Services Program-Mastitis Control Program.

VETDL 700 Special Projects in Diagnostic Endocrinology (Selective)

Fall and spring. 1-3 credits. By permission of the instructor. Letter grades only. T. J. Reimers.

An independent-study course. Students have opportunity to research a particular topic in diagnostic/clinical endocrinology of animals.

VETDL 701 Special Projects in Infectious Diseases (Selective)

Fall and spring. 1-3 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty.

This course provides laboratory experience with attention to specific aspects of infectious disease problems.

VETDL 702 Special Topics in Infectious Diseases (Selective)

Fall and spring. 1-3 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty.

The objective of this course is to offer a broad exposure to various aspects of infectious diseases.

VETDL 703 Doctoral-Level Thesis Research (Graduate)

Fall and spring. 6-9 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty.

Research leading to a Ph.D. degree.

VETDL 704 Master's-Level Thesis Research (Graduate)

Fall and spring. 1-3 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty.

Research leading to a M.S. degree.

Microbiology, Immunology, and Parasitology

VETMI 315 Basic Immunology Lectures (Undergraduate) (also Biological Sciences 305)

Fall. 3 credits. Strongly recommended: basic courses in microbiology, genetics, and biochemistry. Letter grades only. A.J. Winter.

A survey of immunology, with emphasis on the biological functions of the immune response.

VETMI 318 Pathogenic Bacteriology and Mycology (Undergraduate) (also Biological Sciences 304)

Spring. 2 credits. Intended primarily for graduate and undergraduate microbiology majors. Prerequisites: Microbiology 290 and 291 (College of Agriculture and Life Sciences). Strongly recommended: VETMI 315. Letter grades only. E.D. Tullson.

This is a lecture course in medical microbiology, covering pathogenic bacteriology and mycology. Lectures cover the major groups of bacterial pathogens and some of their important virulence mechanisms, as well as highlighting certain aspects of the normal flora, antibiotic therapy, and drug resistance that are relevant to the pathogenesis of bacterial and mycotic diseases. One important principle that is emphasized is that disease is the product of the interaction of the host, pathogen, and environment.

[VETMI 331 Medical Parasitology (Undergraduate)]

Fall, even-numbered years. 2 credits. Prerequisite: zoology or biology. Letter grades only. M.F. Frongillo, D.D. Bowman.

A systematic study of arthropod, protozoan, and helminth parasites of public-health importance, with emphasis on epidemiological, clinical, and zoonotic aspects of these parasitisms.]

VETMI 417 Viruses and Disease (Selective)

Spring, even-numbered years. 3 credits. Intended primarily for graduate and undergraduate microbiology majors. Prerequisites: Microbiology 290 and 291 (College of Agriculture and Life Sciences), VETMI 315; recommended: Genetics 281. Letter grades only. J.W. Casey.

The course will cover basic concepts in virology with emphasis

on virus-host interactions, strategies for gene regulation, and mechanisms of pathogenicity. Selected viral infections that result in immune dysfunction and neoplasia will be highlighted in the context of approaches to prevent or reduce the severity of diseases.

VETMI 510 Veterinary Parasitology

Fall. 4 credits. Limited to second-year veterinary students. Prerequisites: zoology and biology. Letter grades only. D.D. Bowman, E.J. Pearce, M.F. Frongillo.

A systematic study of arthropod, protozoan, and helminth parasites of vertebrate animals, with particular emphasis on the bionomics, epidemiology, and control of parasitisms of veterinary and public-health importance. Laboratories consist of practical exercises in the antemortem and postmortem diagnosis of arthropod, protozoan, and helminth parasitisms of domestic animals and the interpretation of their pathogenetic significance.

VETMI 516 Infectious Diseases I: Bacteriology and Mycology

Fall. 4 credits. Limited to second-year veterinary students. Letter grades only. S.G. Campbell (coordinator), E.D. Tullson, L.E. Winter.

The lectures are intended to provide an understanding of the pathogenesis of bacterial and mycotic infections in domestic animals. Thus the student is given the basis for an informed approach to the clinical signs, diagnosis, treatment, and prevention of the more important bacterial and fungal diseases. Laboratory exercises are concerned with the isolation, culture, and identification of the major groups of veterinary bacterial and fungal pathogens as they occur in clinical material. Students have the opportunity to collect and culture specimens and make presumptive bacteriologic or fungal diagnoses based on their own investigations in the laboratory and the case histories involved. The laboratory exercises are supplemented with small group discussion-demonstration sessions on interesting cases and diagnostic material.

VETMI 517 Infectious Diseases II: Virology and Viral Diseases

Fall. 2 credits. Required of all second-year veterinary students. Letter grades only. F.W. Scott.

This course covers viruses that produce important diseases in animals. The first third of the term covers general virology, and the remaining two-thirds covers viral diseases, including the basic properties of the virus, how the virus produces disease, and how the host responds to the virus infection. Virological and serological procedures important for the diagnosis of various virus diseases are discussed.

VETMI 518 Infectious Diseases III: Infectious and Zoonotic Diseases

Spring. 2 credits. Required of all second-year veterinary students. Others by permission of the instructor. Letter grades only. L.E. Winter, zoonotic diseases (coordinator), M.J. Appel, foreign-animal diseases, and guest lecturers.

This course describes the etiology, pathogenesis, clinical signs, differential diagnosis, methods of spread, reservoir hosts, methods of prevention and control of diseases transmissible to man, and foreign-animal diseases that resemble indigenous infectious diseases or present serious economic or public health threats to the United States. Sections on food-borne, water-borne, and occupational diseases are included.

VETMI 605 Special Projects in Microbiology (Selective) (Undergraduate)

Fall and spring. Credit to be arranged. By permission of the instructor. Prerequisite: a good background in microbiology or immunology. S-U grades only. Microbiology staff. Preferably, students should have background in pathogenic microbiology and immunology.

The course normally provides an opportunity for the student to work in a research laboratory or carry out a special project under supervision.

VETMI 606 Small Animal Infectious Diseases (Selective)

Spring. 2 credits. Prerequisite: three semesters of the veterinary college curriculum or permission of the instructor. S-U grades only. F.W. Scott and guest lecturers.

This course is designed to give the future small-animal practitioner a greater understanding of the infectious diseases of the dog and cat. Emphasis is on etiology,

pathogenesis, diagnosis, treatment, and prevention. The diseases covered include the diseases of dogs and cats that are caused by viruses, bacteria, fungi, and protozoa.

VETMI 607 Virus Diseases of Cattle (Selective)

Fall, even-numbered years. 1 credit. Limited to third- and fourth-year veterinary students. Open to graduate students in the veterinary college by permission of the instructor. S-U grades only. F.H. Fox, J.H. Gillespie, J.M. King, and guest lecturers.

This course is designed to give the future bovine practitioner an understanding of the viral diseases of cattle raised in the United States. Emphasis is on clinical signs and diagnosis, etiology, pathogenesis, pathology, control and prevention (including maternal immunity), vaccination, and other therapy. A clinician, a pathologist, and a microbiologist are in attendance at every lecture to cover each aspect of the disease as it relates to their discipline. This assures complete coverage of each topic through appropriate interaction and integration of the subject matter.

✓ VETMI 615 Research Opportunities in Veterinary Medicine (Selective)

Fall, spring, summer, and January. 1-4 credits. By permission of the instructor. Microbiology faculty.

An independent-study course. Students work closely with individual faculty members in their research laboratories.

VETMI 651 Clinical Parasitology of Avian Species (Selective)

Spring. 1 credit. Open to third- and fourth-year veterinary students only. Maximum enrollment, 8 students. S-U grades only. D. D. Bowman.

This course, consisting of 1 lecture and 1 laboratory per week,

presents advanced veterinary students with the methods used in detecting, diagnosing, and treating parasitic infections of birds. Non-domestic species will be emphasized, but poultry specimens serve as examples because of availability and current knowledge. Arthropod, protozoan, and helminth parasites are considered.

VETMI 700 The Biology of Animal Viruses (Selective) (Undergraduate)

Fall, odd-numbered years. 2 credits. Letter grade only. C.R. Parrish.

This course is a general introduction to the biology of animal viruses. A brief history of the concept and study of viruses, along with an overview and classification of the major viral groups will be given. Topics include the structures of viruses and their components, viral nucleic acids and genome replication strategies, selected examples of gene regulation mechanisms, structural and non-structural viral proteins, and the interactions between viruses and cells. Some traditional and recent examples of methods for the genetic analysis of viruses will be given. Further topics include evolution, variation, and selection of virus strains over time and during infections of host animals; traditional and novel approaches to vaccine development; and antiviral chemotherapy.

[VETMI 701 Models of Viral Pathogenesis]

Fall, even-numbered years. 2 credits. Open to graduate students and most advanced undergraduates, with permission of instructor. C.R. Parrish.

In this course the most recent advances in viral pathogenesis will be examined by reviewing model systems. In the process, the mechanisms of cell and animal infection, epidemiology of virus infections, spread between cells,

disease mechanisms, roles of the immune response in enhancing or suppressing the disease, and examples of the mechanisms involved in different types of disease will be examined in a variety of systems. The basic principles of virus taxonomy, structure, and replication will be briefly reviewed, to introduce the various virus groups and their special properties. An overview of the basic principles of viral pathogenesis and disease will be based around various texts, including *The Pathogenesis of Disease*, third edition, which will be used as a general introduction to the area. For studying model systems of viral disease, students will use *Concepts in Viral Pathogenesis*, volumes 1-3, which contains short and simple introductions to the various virus diseases. The most recent literature will be used to bring students up-to-date on these topics.]

[VETMI 702 Molecular Biology and Immunology of Host-Parasite Interactions]

Fall, even-numbered years. 2 credits. E.J. Pearce.

The primary objective of this lecture course will be to make the student aware of the most important areas of research in contemporary parasitology. Lectures will focus on a broad range of parasites, with an emphasis on those of medical importance. Recently published research articles and reviews will be used as the basis to explore the issues of host invasion, evasion of host defense mechanisms by parasites, vaccination against parasitic infections, chemotherapy, vector biology, and molecular diagnosis. Biological processes especially well understood through work on parasites, such as RNA editing and GPI-anchor biosynthesis and structure, will be covered in

detail.]

VETMI 705 Advanced Immunology Lectures (also Biological Sciences 705) (Graduate)

Spring, even-numbered years. 3 credits. Prerequisite: VETMI 315 Basic Immunology Lectures or permission of instructor. Letter grades only. A.J. Winter (coordinator) and staff.

Coverage at an advanced level of molecular and cellular immunology.

VETMI 706 Immunology Seminar Series (Graduate)

Fall and spring. No credit. Required of all graduate students in the Field of Immunology. S-U grades only. S.A. Naqi, R.G. Bell.

Presentations of research investigations by Cornell faculty members, postdoctoral fellows, and graduate students in the Field of Immunology, and by invited speakers from other institutions.

VETMI 707 Advanced Work in Bacteriology, Virology, and Immunology (Graduate)

Fall and spring. Credit to be arranged. By permission of the instructor. Microbiology staff.

This course is designed primarily for graduate students with a good background in pathogenic microbiology and immunology. It may be elected by veterinary students who are properly prepared.

VETMI 708 Selected Topics in Animal Virology (Graduate)

Spring. 2 credits. Letter grade only.

Lectures focus on the molecular biology of a few selected animal viruses. Important publications will provide the basis for a discussion of current models for host-viral interactions.

VETMI 709 Laboratory Methods of Diagnosis (Graduate)

Fall and spring. 1-3 credits by arrangement. By permission of instructor. Microbiology staff.

Instructions and practice in the application of microbiological and serological methods for the diagnosis of disease.

VETMI 710 Microbiology Seminar (Graduate)

Fall and spring. 1 credit. Required of all graduate students in the Department of Microbiology, Immunology, and Parasitology. S-U grades only. E.J. Pearce, C.R. Parrish.

[VETMI 719 Immunology of Infectious Diseases and Tumors (also Biological Sciences 706) (Graduate)]

Spring, odd-numbered years. 2 credits. Prerequisite: VETMI 315 Basic Immunology Lectures or permission of instructor. S-U optional. A.J. Winter (coordinator) and staff.

Coverage at an advanced level of the immunology of diseases caused by selected bacterial, viral, protozoan, and helminthic parasites, and tumor immunology.]

[VETMI 721 Special Topics in Immunology: Neuroendocrine-Immune Interactions (Graduate)]

Spring, odd-numbered years. 1 credit. Prerequisite: VETMI 315 Basic Immunology Lectures or permission of instructor. S-U optional. J.A. Marsh.

Interactions of the immune and neuroendocrine systems in the development of the immune system and immunoregulation will be examined. The course format will be a combination of lectures, discussions, and paper presentations.]

[VETMI 722 Special Topics in Immunology: Nutrition and Immunity (Graduate)]

Spring, odd-numbered years. 1 credit. Prerequisite: VETMI 315 Basic Immunology Lectures or permission of instructor. S-U optional. J.A. Marsh, R.R. Dietert.

The effects of specific nutrient deficiencies, general calorie intake, and nutritional enhancements on immune development and function will be examined. The course format will be a combination of lectures, discussions, and paper presentations.]

VETMI 737 Advanced Work in Animal Parasitology (Graduate)

Fall and spring. 1-3 credits by arrangement. For advanced undergraduate and graduate students. Letter grades only. D.D. Bowman and other faculty.

This course is intended for graduate students minoring in parasitology and for highly motivated veterinary students with interests in parasitology research.

VETMI 783 Seminars in Parasitology (Selective) (Graduate)

Fall and spring. 1 credit. Open to veterinary students, graduate students minoring in the field of parasitology. Others by permission of the instructor. S-U grades only. D.D. Bowman.

This is a seminar series designed to acquaint students with current research in the field of parasitology. The range of topics is determined, in part, by the interests of those participating and may include such topics as the ecology of parasitism, parasite systematics, immunoparasitology, and parasitic diseases of plants and animals, including humans.

Pathology

Bendicht U. Pauli, chair
216 Veterinary Research Tower
607-253-3300

VETPA 535 Veterinary Pathology I

Fall. 4 credits. Required of all second-year veterinary students. Others by permission of the instructor. Prerequisites: VETA 502 and 503 or equivalent histology courses. Letter grades only. B.J. Cooper (coordinator) and faculty.

A study of disease processes at the molecular and cellular levels: injury, adaptation, and repair, derangements in body fluids and blood flow, the inflammatory process, the nature and causes of neoplastic disease, and the relationship of genetics to disease are discussed as general processes at a mechanistic level.

VETPA 536 Veterinary Pathology II

Spring. 4.5 credits. Required of all second-year veterinary students. Not open to others. Prerequisite: VETPA 535. Letter grades only. D. H. Schlafer (coordinator) and other faculty.

A systematic study of the diseases in each major organ system with emphasis on differential diagnostic features and the correlation of disturbed function with morphologic change.

VETPA 539 Introduction to Laboratory Animal Medicine

Spring. 1 credit. Required of all third-year veterinary students. Others by permission of the instructor. Prerequisites: Pathology 535 and 536. Letter grades only. F. W. Quimby and others.

An introduction to the biology and diseases of common laboratory animal species, including mice, rats, hamsters, guinea pigs, rabbits, and non-human primates. The etiology and pathogenesis of the

most prevalent diseases are emphasized. Practical means of diagnosis and treatment are discussed. The course also provides an overview of the many aspects of laboratory animal medicine as practiced in academe, industry, and research. Two optional laboratory sessions are offered in animal handling and clinical techniques.

VETPA 540 Pathology Service

Fall, spring, and summer. 2 credits. Required of all fourth-year veterinary students. Not open to others. Letter grades only. J. M. King (coordinator) and others.

This course involves the hands-on diagnostic necropsies of most mammalian species that come to the pathology necropsy room and of avian species that are admitted to the avian and aquatic animal medicine necropsy room. Students work in groups of three to five for the two-week rotation. Necropsies are performed under the guidance of pathology faculty, residents, or interns. Students prepare written reports of necropsies performed, review microscopic hematology and cytology slides, perform urinalyses, and discuss case studies.

VETPA 549 Laboratory Animal Medicine Rotation

Fall or spring. 2 credits. Limited to fourth-year veterinary students. Letter grades only. F. W. Quimby and others.

The practice of laboratory animal medicine requires a combination of preventive programs, clinical skills, knowledge of various species' biologies, familiarity with research methodology, and acquaintance with state and federal regulations. This course is offered as a two-week introduction to that specialty. Students accompany laboratory animal veterinarians on clinical rounds of Cornell's research animal housing and participate in laboratory diagnostic work. Review sessions are con-

ducted on the biology, medicine, and husbandry of rodents, rabbits, and primates and on current legislation regulating the care and use of research animals. The course may include a field trip to the research animal facilities of Rockefeller University, the Cornell University Medical College, and the Laboratory of Experimental Medicine and Surgery in Primates.

VETPA 571 Clinical Pathology

Spring. 3 credits. Required of all second-year veterinary students. Others by permission of the instructor. Prerequisites or co-requisites: VETPA 535 and VETPA 536. Letter grades only. J.T. Blue.

The lecture and laboratory course teaches the methods and interpretation of laboratory tests in the areas of hematology, clinical chemistry, urinalysis, and diagnostic cytology.

VETPA 636 Wildlife Pathology (Selective)

Fall. 2 credits. Intended for first-, second-, and third-year veterinary students. Open to others. J. M. King.

A presentation of the nature and causes of diseases of wild rabbits, opossums, squirrels, deer, certain waterfowl, and some other species. Emphasis on epizootiology, etiology, pathogenesis, diagnostic lesions, and effects on populations. Laboratory experience in specimen collection and necropsy techniques. Guest lectures are provided on ecology and population dynamics by members of the Department of Natural Resources.

VETPA 637 Postmortem Pathology (Selective)

Fall and spring. 1 credit. Intended for first-, second-, or third-year veterinary students. J. M. King.

A presentation of gross and microscopic lesions of diagnostic significance, employing color projection slides as illustrations. Emphasis on pathological and

differential diagnosis of a wide spectrum of viral, metabolic, bacterial, parasitic, and other diseases.

VETPA 638 The Bottom Line (Selective)

Fall and spring. 1 credit. Limited to veterinary students. S-U grades only. R. M. Lewis.

This course is organized in a modified Clinical-Pathologic Conference format. Selected case material derived from the Teaching Hospital patient population is discussed, emphasizing and illustrating the salient clinical, antemortem, and postmortem features of twenty-eight disease entities each semester. Interactive discussion between participating faculty and students follows each case presentation.

[VETPA 639 Autotutorial in Laboratory Animal Medicine and Science (Selective)]

Spring. 1-3 credits. F.W. Quimby.

This course is offered to individuals interested in pursuing various aspects of laboratory animal medicine and science in depth. A variety of resources are available to assist students in their research on a particular topic: the library of the Division of Laboratory Animal Medicine, including the autotutorial library; the university libraries; and special information collected from other institutions. Grades are determined on the basis of a paper, an oral presentation, or the creation of an audiovisual teaching aid, any of which may be selected by the student.]

VETPA 640 Principles of Toxicological Pathology (Selective)

Fall, odd-numbered years. 3 credits. Intended for veterinary and graduate students, and residents. J. M. King.

The primary objective of this course is to make the student aware of the problems and their solutions encountered in pathology as it applies to the field of toxicology, with special emphasis on industrial toxicology and governmental regulations.

VETPA 641 Clinical Immunology (Selective)

Fall. 1 credit. Limited to veterinary students. Others by permission of the instructor. R. M. Lewis.

This course emphasizes the clinical aspects of 15 specific diseases that are mediated by immunologic processes. Case material from the Teaching Hospital is used to illustrate the presenting clinical signs, laboratory diagnostic methods, clinical course, therapeutic approaches, and eventual outcome of each disease under discussion. Student participation in the informal case discussions is encouraged as a means of introducing students to the practice of veterinary medicine through case discussion and analysis. Training is also provided in the use of the college's computerized biomedical information system and the hospital records system to develop a critical case analysis, which serves as the basis for grading.

VETPA 642 Public Policy and Laboratory Animal Science (Selective)

Spring, even-numbered years. 2 credits. Intended for fourth-year veterinary students, residents, and veterinarians enrolled in the Graduate School who have a serious interest in pursuing a career in laboratory-animal medicine. Prerequisite: VETPA

539 or equivalent. One evening each week for two hours. F. Quimby and others.

The course is conducted as a series of small-group discussions with individual participation and weekly readings required. It focuses on public policy in laboratory animal science and includes the following discussion topics: public perceptions of animal use in teaching, research, and testing; federal and state laws governing animal use; the recognition and alleviation of pain and distress during animal experimentation; euthanasia; biological hazards in animal research; alternatives and adjuncts to animals in research; and factors that complicate animal research.

VETPA 643 The Use of Animal Models to Explore Physiologic and Pathologic Mechanisms in Animals and Man (Selective)

Fall. 2 credits. Intended for fourth-year veterinary students, residents, and veterinarians enrolled in the Graduate School who have a serious interest in pursuing a career in laboratory-animal medicine. Prerequisite: VETPA 539 or equivalent. F.W. Quimby and others.

The course is conducted as a series of small-group discussions with individual participation and weekly readings required. It focuses on the use of animal models for exploring physiologic and pathogenetic mechanisms in animals and man. This segment includes the following discussion topics: the value of basic research, the benefits of animal research to human and animal health, the requisite features of an appropriate animal model, the origin of inbred and congenic strains, transgenic animals, and a survey of animal models. Animal models used in investigations of body systems (pulmonary, CNS, hematologic) are the focus during

even-numbered years, while models of disease processes (oncology, virology, autoimmunity), as well as aging and transplantation, are the focus in odd-numbered years.

VETPA 736 Pathology of Nutritional Diseases (Selective)

Spring. 3 credits. For graduate students in pathology or nutrition and an elective course for second-, third-, or fourth-year veterinary students. Prerequisite: VETPA 535. Letter grades only. L.P. Krook.

VETPA 750 Cancer Cell Biology

Spring. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. J.L. Guan, R.A. Levine, B.U. Pauli, A. Yen.

This graduate course will focus on the role of oncogenes, tumor suppressor genes, extracellular matrix and cell surface adhesion receptors in tumorigenesis and tumor progression. It will be taught in large part from the contemporary literature. The course outline is: I. Cell Proliferation and Oncogenes, II. Regulatory Effects of Cell-Substrate and Cell-Cell Interactions, and III. Angiogenesis, Invasion and Metastasis.

VETPA 788 Seminar in Surgical Pathology

Fall and spring. 1 credit. Intended for residents. Third- and fourth-year veterinary students may attend. Letter grades only. B.A. Summers (coordinator) and others.

The major objective of this discussion and seminar course is to introduce the residents to the discipline of surgical pathology. Selected material from the Surgical Pathology Service is prepared in advance for independent review by the residents. The material is presented in a slide-seminar

format by the residents under the review of the faculty. Emphasis is placed on pathogenesis, etiology, and pathologic descriptions of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

VETPA 789 Seminar in Necropsy Pathology (Selective)

Fall and spring. 1 credit. Letter grades only. J.M. King.

The major objective of this course is to introduce students (veterinary and graduate students, residents) to the gross and microscopic features of necropsy pathology. Selected material from the Necropsy Service is prepared in advance for independent review by the students. This material is presented in a slide-seminar format by the students under the review of the faculty. Emphasis is on pathogenesis, etiology, and pathologic description of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

VETPA 794 Lectures in Special Pathology

Spring. 3 credits. By permission of the instructor. Letter grades only. D. H. Schlafer.

This course covers only the lecture portion of Pathology 536, consisting of a systematic study of the diseases in each major organ system with emphasis on differential diagnostic features and the correlation of disturbed function with morphologic change.

[VETPA 796 Medical Primatology (Selective)]

Fall, odd-numbered years, but not fall 1993. 1 credit. For residents and graduate students, by permission of instructor. F. Quimby.

A survey of major diseases, medical care, and management techniques for all life stages of primates. Topics include physical examination, restraint anesthesia, housing, and management of various non-human primate species; bacterial, viral, and parasitic diseases; non-infectious diseases; infant and nursery care reproduction and behavioral considerations; and therapeutics.]

Pharmacology

Geoffrey W.G. Sharp, chair
607 253-3650

VETPR 528 Pharmacology I (also Toxicology 528)

Fall. 4 credits. Second-year veterinary students, or permission of the instructors. Letter grades only. R.A. Cerione and other faculty.

Topics covered include physiological disposition of drugs and poisons, drug-receptor interactions, cell and organ pharmacology, and actions of drugs affecting the nervous system. Several clinical topics are covered in the laboratory session

VETPR 529 Pharmacology II

Spring. 2 credits. Prerequisite: VETPR 528 or permission of the instructors. Letter grades only. W.S. Schwark and other faculty.

Topics covered include chemotherapy and the action of drugs affecting the heart, gastrointestinal tract, skin, and the respiratory, endocrine, and urinary systems.

VETPR 607 Introduction to Pharmacology

Fall. 1 credit. By permission of the instructors. Letter grades only. R.A. Cerione and other faculty.

An introduction to basic pharmacological principles for non-veterinarians. Topics covered include physiological disposition of drugs and poisons and drug-receptor interactions.

VETPR 608 Basic Pharmacology

Fall. 3 credits. By permission of the instructors. Letter grades only. R.A. Cerione and other faculty. Basic pharmacology for non-veterinarians.

Topics as for Pharmacology I (VETPR 528) but excluding the laboratory session.

VETPR 619 Clinical Pharmacology (Selective)

Fall. 1 credit. Limited to third- and fourth-year veterinary students. Others by permission of the instructor. S-U grades only. W.S. Schwark.

An extension of the core veterinary pharmacology courses, VETPR 528 and 529. Emphasis will be on selected topics in veterinary therapeutics with reference to clinical case material.

VETPR 620 Advanced Clinical Pharmacology (Selective)

Spring. 1 credit. Limited to third and fourth year veterinary students. Others by permission of the instructor. S-U grades only. W.S. Schwark.

An extension of VETPR 619.

VETPR 621 Toxicology (also Toxicology 621)

Spring. 1 credit. Non-veterinary students by permission of the instructor. S-U grades only. W.S. Schwark.

Basic and clinical aspects of the more common poisonings that affect domestic animals are considered. Emphasis is on heavy-metal poisoning; chelation phenomena; selected organic poisonings, including pesticides, herbicides, and rodenticides; and forensic considerations.

VETPR 622 Special Projects in Pharmacology

Fall, spring, and summer. 1-3 credits. By permission of the instructor. Pharmacology faculty.

VETPR 629 Research Opportunities in Veterinary Medicine

Fall, spring, summer, or January. 1-4 credits. By permission of the instructor. S-U grades only. Pharmacology faculty.

An independent-study course. Students work closely with individual faculty members in their research laboratories.

VETPR 660 Safety Evaluations in Public Health (also Toxicology 660)

Spring, even-numbered years. 2 credits. Limited to second-, third- and fourth-year veterinary students and graduate students. Others by permission of the instructor. Prerequisites: an introductory or intermediate course in biology, biochemistry or physiology. A concurrent or prior course in toxicology would be helpful. J.G. Babish.

Applying toxicologic methods for assessing chemical hazards to populations has become a major role of toxicologists in industry and government today. In this course, current methodologies in risk assessment will be presented with

emphasis on the interpretation of data in terms of public health effects. Topics covered include: (1) the concept of a safe level, (2) standards for acceptable testing, (3) good laboratory practices and government regulations, (4) testing procedures used in safety evaluation, and (5) monitoring human populations. Students will be evaluated on their ability to interpret data from animal studies and to estimate risks of human exposure.

VETPR 700 Calcium as a Second Messenger in Cell Activation

Spring, odd-numbered years. 2 credits. By permission of the instructor. Lecture-discussion. C.M.S. Fewtrell.

Regulation of intracellular calcium and techniques for studying calcium movements and distribution in cells. Calcium channels and exchangers, calcium-binding proteins and calcium stores. Phosphatidylinositol turnover, release of calcium from intracellular stores and activation of calcium influx. Calcium gradients and oscillations. Other signal transduction pathways and second messengers involved in cell activation. Each topic will be introduced with a lecture that will be followed by discussion of recent papers from the literature.

VETPR 701 Organ System Toxicology

Fall, odd-numbered years. 1 credit. W.S. Schwark.

A mini-course on molecular mechanisms involved in chemical toxicity. Specific examples of toxicity in organ systems such as the nervous system, kidney, liver, respiratory tract and cardiovascular system will be considered.

VETPR 703 Receptor Binding: Theory and Techniques (also Biological Sciences 790-02)

Spring, even-numbered years. 2 credits. By permission of the instructors. R.E. Oswald and G.A. Weiland (coordinator).

The course covers both the practical and theoretical tools needed to set up and use a radioligand binding assay to measure and characterize physiologically and pharmacologically relevant neurotransmitter, hormone, and drug receptors. The emphasis of the course is on the quantitative and physical chemical aspects of receptor binding. Topics discussed are historical background of receptor theory; basic methods of a radioligand binding assay, including various methods of separating and measuring bound and free ligand; methods of analyzing equilibrium binding, the thermodynamic basis of the binding; equilibrium binding for complex binding mechanisms, including allosteric mechanisms; coupling of binding to response; antagonism of response and inhibition of binding; kinetics of simple and complex binding mechanisms; and common artifacts encountered in radioligand binding assays.

[VETPR 704 CNS Neuropharmacology: Mechanisms of Synaptic Transmission

Fall, every third year, next offered fall 1994. 2 credits. Limited to 20 graduate students and undergraduate seniors, by permission of the instructor. L.M. Nowak.

This is a survey course in vertebrate central nervous system physiology and pharmacology, and focuses on mechanisms of neurotransmitter action at the membrane and cellular levels. Roles of selected neurotransmitters in normal and dysfunctional brains

are covered. Topics are introduced in lectures and followed up in discussions of recent journal articles.]

VETPR 705 Molecular Mechanisms of Receptor-G Protein Coupled Signaling
Spring, even-numbered years. 2 credits. By permission of the instructor. R.A. Cerione.

This course focuses on the mechanisms of action of GTP binding proteins. A number of receptor-coupled signaling systems are examined, including adenylate cyclase, vertebrate vision, phosphatidylinositol lipid turnover, and receptor systems regulating various ion channels.

VETPR 706 Growth Factor-Coupled Signaling (also Biological Sciences 734)
Spring, odd-numbered years. 0.5 credits. By permission of the instructor. R.A. Cerione.

General theme will be mitogenic signaling pathways. Receptor tyrosine kinases, src, ras and ras-regulatory proteins will be covered.

Special Projects and Research in Pharmacology
Fall, spring, and summer. 1-3 credits each topic. By arrangement with the instructor. Pharmacology faculty. Independent study or research.

VETPR 711 The Role of Calcium in Stimulus-Secretion Coupling
C.M.S. Fewtrell.

VETPR 712 Eosinophil Stimulus-Response Coupling
C.M.S. Fewtrell

VETPR 713 Mechanisms of Growth-Factor Action
R.A. Cerione.

VETPR 714 Central Nervous System Neurotransmitters
L.M. Nowak.

VETPR 718 Structure-Function of the Nicotinic Acetylcholine Receptor
R.E. Oswald. VETPR 720 Modulation of Nicotinic Acetylcholine Receptor Function
G.A. Weiland.

VETPR 723 The Role of Calcium in the Control of Electrolyte Transport
G.W.G. Sharp.

VETPR 724 The Control of Hormone Secretion
G.W.G. Sharp.

VETPR 730 Graduate Research in Pharmacology 1-10 credits.

This course is offered by individual faculty members in the Department of Pharmacology for graduate students undertaking research towards M.S. or Ph.D. degrees.

Special Topics in Pharmacology
Fall, spring and summer. 1-3 credits each topic. By arrangement with the instructor. Pharmacology faculty. Reading and discussions.

VETPR 741 Neuromodulation
G.A. Weiland.

VETPR 742 Receptor Mechanisms
G.A. Weiland.

VETPR 745 Biochemical Neuropharmacology
G.A. Weiland

VETPR 747 Amino Acid Neurotransmitters
L.M. Nowak.

VETPR 748 Stimulus-Secretion Coupling
C.M.S. Fewtrell.

VETPR 749 Second Messengers in Cell Activation
C.M.S. Fewtrell.

VETPR 750 Cell Calcium
C.M.S. Fewtrell.

VETPR 754 G Proteins in Signal Transduction
R.A. Cerione.

VETPR 755 Calcium in the Control of Hormone Secretion
G.W.G. Sharp.

VETPR 756 Mechanisms of Calcium Handling
G.W.G. Sharp.

VETPR 757 Intestinal Electrolyte Transport
G.W.G. Sharp.

VETPR 760 Advanced Topics in Pharmacology
Pharmacology faculty.

Physiology

David Robertshaw, chair
727 Veterinary Research Tower
607-253-3854

[Bio S 214 Biological Basis of Sex Differences (Undergraduate)]

Fall, alternate years. 3 credits. Prerequisite: one year of introductory biology. Occasional discussions to be arranged. J. E. Fortune.

The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction; where possible, special attention is given to studies of humans. Current evidence of the effects of gender on non-reproductive aspects of life (behavior, mental and physical capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and a basis for objective evaluation of sex differences in relation to contemporary life.]

Bio S 313 Histology: The Biology of the Tissues (Undergraduate)

Fall. 4 credits. Prerequisite: one year of introductory biology; a background in vertebrate anatomy and organic chemistry or biochemistry strongly recommended. R.B. Silver.

Provides the student with a basis for understanding the microscopic, fine structural, and functional organization of vertebrates, as well as the methods of analytic morphology at the cell and tissue levels. The dynamic interrelations of structure, composition, and function in cells and tissues are emphasized. (Course may include work with invertebrate and/or vertebrate animals.)

Bio S 316 Cellular Physiology (Undergraduate)

Spring. 4 credits. Limited to 100 students, with preference given to students concentrating in animal physiology and anatomy. Each lab limited to 24 students.

Prerequisite: concurrent or previous enrollment in Biological Sciences 330 or 331. Lectures, A. Quaroni and staff.

Lectures introduce students to the most current information on the ways cells function and regulate themselves and neighboring cells and on what molecules are involved in those regulatory processes. Laboratories provide an introduction to cell and organ culture and to immunological techniques used to study cell structure and function in vivo and in vitro. Experiments performed in the laboratory are closely related to subjects covered in the lecture and provide practical experience with them.

VETPH 346 Introductory Animal Physiology (also Biological Sciences 311) (Undergraduate)

Fall. 3 credits. Prerequisites: one year of college-level biology, chemistry, and mathematics. E.R. Loew; D. Robertshaw.

A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure-function relationships are stressed along with underlying physical-chemical mechanisms.

Bio S 458 Mammalian Physiology (Undergraduate)

Spring. 3 credits. Enrollment limited. Graduate student auditors allowed. Prerequisite: Biological Sciences 311 (VETPH 346) or equivalent with permission of instructor. K.W. Beyenbach and staff.

Selected topics in mammalian physiology are discussed in the lecture and concurrently studied in the laboratory. Topics are selected from the following: physiology of excitable and epithelial cell membranes, the autonomic nervous system, cardiovascular physiology, gastrointestinal physiology, renal physiology, energy metabolism, and acid-base balance. Live animals and isolated living tissues are studied in the laboratory portion of the course.

Bio S 499 Undergraduate Research in Biology (Undergraduate)

Fall and spring. Variable credit. Prerequisite: written permission from the staff member who will supervise the work and assign the grade. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work.

This course is divided into multiple sections as printed in the Course and Time Roster and its supplement. Students must register under supervisor's assigned section number or under section 1 if supervisor was not assigned a

section number. Staff. Practice in planning, conducting, and reporting independent laboratory and library research programs. Research credits may be used in completion of the following concentration areas: animal physiology and anatomy; biochemistry; botany; cell biology; and ecology, systematics, and evolution. No more than 4 credits of research may be used in completion of the following concentration areas: genetics and development, neurobiology and behavior.

VETPH 612 Research Opportunities in Veterinary Medicine (Selective)

Fall, spring, summer, and January. 1-4 credits. Limited to veterinary students. By permission of the instructor. Physiology faculty.

An independent-study course. Students work closely with individual faculty members in their research laboratories.

Bio S 619 Lipids (Graduate) (also Nutritional Sciences 602)

Fall. 2 credits. A. Bensadoun.

An advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis is placed on critical analysis of current topics in lipid methodology; lipid absorption; lipoprotein secretion, molecular structure, and catabolism; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

VETPH 625 Problems in Dog and Cat Behavior (Selective) (also VTMED 681)

Spring. 1 credit. Students of other colleges by permission of the instructor. K. A. Houpt.

See description for VTMED 681.

VETPH 626 Problems in Equine Behavior (Selective) (also VTMED 680)

Spring. 1 credit. Students of other colleges by permission of the instructor. K. A. Houpt.

See description for VTMED 680.

VETPH 627 Acid-Base Relations (Selective) (also VTMED 682, and Biological Sciences 715)

Fall, spring, and summer. 2 credits. Students of other colleges by permission of the instructor. Prerequisite: VETPH 526 or permission of the instructor. A. Dobson.

See description for VTMED 682.

VETPH 628 Graduate Research in Animal Physiology (Graduate) (also Biological Sciences 719)

Fall and spring. Variable credit. Prerequisite: written permission of section chairperson and staff member who will supervise the work and assign the grade. S-U grades optional.

Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.

Bio S 710-718 Special Topics in Physiology (Graduate)

Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Enrollment in each topic may be limited. S-U grades optional, with permission of instructor.

Lectures, laboratories, discussions, and seminars on specialized topics

Fall 1993: Four topics are offered.

Bio S 711 Physiological Control of Food and Water Intake: Hunger and Thirst

Fall, odd-numbered years. 1 credit. T.R. Houpt.

The physiological control systems that control ingestive behavior: food and water intake. A variety of species will be considered with emphasis on common mammalian species: rat, dog, goat, pig, horse, and human. A mixed lecture/seminar format will be used.

Bio S 712 Membrane and Epithelial Transport

Fall, odd-numbered years. 1 credit. K.W. Beyenbach.

The course will begin with a series of lectures on the structure and function of membrane pumps, carriers, and channels. Thereafter, the students will read and discuss recent review articles on these subjects. When appropriate, there will be laboratory demonstration to illustrate how some of these transport systems are experimentally studied.

Bio S 713 Thermal Regulation and Exercise

Fall, odd-numbered years. 1 credit. D. Robertshaw.

An examination of the competing demands on the body of exercise and heat exposure with particular emphasis on the cardiopulmonary system and integration of thermoregulatory reflexes.

Bio S 717 Structure and Function of Joints with Emphasis on Arthritis

Fall, even-numbered years. 1 credit. Undergraduate and graduate students. G. Lust.

One-hour lecture each week to be arranged.

Spring 1993: Two topics are offered.

[Bio S 714 Physiology of Pregnancy

Spring, odd-numbered years. 2 credits. P. W. Nathanielsz.

Seminar course covering aspects of maternal, placental, and fetal function. Emphasis on fetal growth, respiration, neural and

endocrine and cardiovascular function, myometrial activity, parturition and placental function.]

Bio S 716 Regulation of Mitosis and the Cell Cycle

Spring. 1 credit. R.B. Silver.

This course will focus on regulatory mechanisms, Ca^{2+} regulation, metabolic pathways that exhibit cell cycle-related periodicities, genetic biochemical and cell physiological studies of the cell cycle, and evidence for intracellular clocks and escapements.

Bio S 718 Evolution of Color

Spring. 1 credit. E. Loew.

VETPH 720 Special Problems in Physiology (Graduate)

Fall and spring. By permission. Laboratory work, conferences, collateral readings, and reports. Adapted to the needs of students.

VETPH 752 Biological Membranes and Nutrient Transfer (Graduate) (also Biological Sciences 618)

Spring, alternate years. 2 credits. Prerequisites: courses in animal or plant physiology, quantitative and organic chemistry and physics, and permission of the instructor. Recommended: a course in cellular physiology. Letter grades only. R.H. Wasserman.

An introduction to elementary biophysical properties of biological membranes, theoretical aspects of permeability and transport, mechanism of transfer of inorganic and organic substances primarily across epithelial membranes, and properties of transporting macromolecules and ion channels.

VETPH 758 Molecular Mechanisms of Hormone Action (Graduate) (also Biological Sciences 658)

Spring, even-numbered years. 3 credits. Prerequisite: permission of instructor. R.A. Corradino.

An advanced course developed from the current literature on endocrine mechanisms.

[VETPH 759 Nutrition and Physiology of Mineral Elements (Graduate) (also Biological Sciences 615 and 659)]

Spring, even-numbered years. 3 credits. Prerequisites: courses in basic physiology, intermediate biochemistry, and general nutrition. R. Schwartz (coordinator); D.R. VanCampen; R.H. Wasserman.

Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the prominent macroelements and microelements, with emphasis on recent developments. Information is included on methodologies of mineral research and the essentiality, requirements, transport, function, homeostasis, interrelationships, and toxicity of various mineral elements.]

Fundamentals of Endocrinology (Graduate) (Animal Sciences 427)

Fall. 3 credits. Prerequisite: human or veterinary physiology or permission of the instructor. W. R. Butler.

The physiology of the endocrine glands and the roles played by each hormone in the regulation of normal body processes is discussed. Endocrine regulation of growth, metabolism, and reproduction is emphasized. Examples are selected from domestic species and humans.

Fundamentals of Endocrinology, Laboratory (Graduate) (Animal Sciences 428)

Fall. 2 credits. Each lab limited to 30 students. Prerequisite: concurrent registration in Animal Sciences 427 or permission of the instructor. W.R. Butler.

Laboratory exercises are designed to demonstrate hormonal mechanisms for each of the major endocrine glands. Laboratory techniques include animal surgery, blood collection, and hormone radioimmunoassay.

Bio S 811 and 812 Advanced Physiology Methods I & II (Graduate)

Fall and spring. 2 credits each. Enrollment limited.

Prerequisites: graduate student status or permission of course coordinator. S-U grades only. Faculty of Physiology.

This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint students with the latest techniques/methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

College of Veterinary Medicine Cornell University

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- ☐ Admissions brochure (D.V.M.)
- ☐ Application for admission (D.V.M.)
- ☐ Guaranteed admission program (D.V.M.)
- ☐ Notice of the annual Open House
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