# CORNELL
UNIVERSITY

# College of Veterinary Medicine

## 1995–1996 Catalog

**Cover: View of Cornell's new Veterinary Medical Center, which will open during the 1995–96 academic year.**

**Opposite: Dr. Eric Trotter (right), 1995 recipient of the Norden Distinguished Teacher Award, examines a patient referred for surgery with fourth-year D.V.M. student Laurie Duffield '96 and Dr. James Farese, small animal surgery resident.**

**Cornell University**
**(USPS 132-860)**

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# College of Veterinary Medicine

**Cornell University 1995–1996**

## Academic Calendar for 1995–1996

| **Fall Semester** | **Class of 1999** | **Class of 1998** | **Class of 1997** | **Class of 1996** |
|---|---|---|---|---|
| Orientation/Registration | August 21–23, 1995 | August 29–30, 1995 | August 29–30, 1995 | |
| Instruction begins | August 24 | August 21 | August 31 | May 22 |
| Fall recess | October 7–10 | September 28–October 1 | October 7–10 | |
| Thanksgiving recess | November 22–26 | November 22–26 | November 22–26 | |
| Last day of classes | December 20 | December 13 | December 22 | |
| Examination periods | during term | during term | during term | |
| **Spring Semester** | | | | |
| Registration | January 19, 1996 | January 19, 1996 | January 19, 1996 | |
| Instruction begins | January 3 | January 22 | January 22 | |
| Spring recess | March 16–24 | March 16–24 | Variable | |
| Last day of classes | May 10 | May 20 | May 20 | May 20 |
| Examination periods | during term | during term | during term | |
| Commencement | | | | May 26 |

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.

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# Contents

# The College of Veterinary Medicine

The College of Veterinary Medicine at Cornell University has a rich heritage and distinguished record in education, research, and professional service. The history of the teaching of veterinary medicine at Cornell predates the establishment of the college in 1894. Shortly after the university was founded in 1865, Ezra Cornell insisted that a chair of veterinary medicine be instituted. His own 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.

President White secured the services of Dr. James Law, an already distinguished veterinarian and teacher of his day, who was a graduate of the Edinburgh Veterinary College in Scotland. Dr. Law became the first professor of veterinary medicine in the United States, and thus Cornell was the first American university to accord veterinary medicine equal rank with other sciences.

When the university opened in the fall of 1868, Dr. Law's first classes included students who were working toward degrees in agriculture and the biological sciences, as well as those pursuing veterinary degrees. At Law's urging, Cornell set much higher requirements for a veterinary degree than any other institution at that time. Four years of study were required for a Bachelor of Veterinary Science (B.V.Sc.) and an additional two years for a Doctor of Veterinary Medicine (D.V.M.). In 1876, Cornell awarded the first D.V.M. degree in the United States to Daniel Elmer Salmon, who had been a member of the university's first entering class and received the B.V.Sc. degree in 1872. He became the founding chief of the U.S. Bureau of Animal Industry and is probably best known today for identifying the pathogen *Salmonella.*

Funding to construct a veterinary building was provided by the state in 1894 at the time of the establishment of the New York State Veterinary College. When the college first opened for classes in the fall of 1896, there were six professors, two instructors, and eleven students. The scholastic requirement 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. In 1992, the library was renamed the Roswell P. Flower–Isidor I. and Sylvia M. Sprecher Library and Learning Resources Center, to recognize Dr. Isidor Sprecher (D.V.M. '39) and his wife for their many generous gifts to the college.

Women have played an important role in the college since its early days. Florence Kimball, the first woman in the United States to receive the D.V.M. degree, graduated from Cornell in 1910. Seven of the first eleven women to become licensed veterinarians in this country were Cornell graduates. Today approximately 70 percent of Cornell's veterinary students are women.

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 located on Snyder Hill.

The ten-story Veterinary Research Tower was added in 1974 and the Diagnostic Laboratory in 1978. A major expansion of college facilities is currently under way. The Veterinary Education Center, consisting of expanded lecture, teaching laboratory, and library facilities, opened in 1993. The Veterinary Medical Center, which will contain a new veterinary medical teaching hospital and greatly expanded office and research space, will open during the 1995–96 academic year.

Over 700 faculty and staff members work together to provide teaching, research, and professional service programs that 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 was 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 thirty 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-two students are admitted each year: approximately sixty New York residents, six to seven from contracting states (New Jersey, New Hampshire, and Puerto Rico), and the remainder from any country or U.S. state.

The college will accept applications through the national Veterinary Medical Central Application Service (VMCAS) from nonresidents. Nonresidents may check the Cornell box on the VMCAS application or they may request a veterinary college application package and apply directly to Cornell. New York State residents should apply directly to the college, not through VMCAS.

## 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 course work 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 table below lists the college-level course requirements that are prerequisites for admission and must be taken for both grade and credit (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, which is not listed as another requirement, will be completed with a grade in fulfillment of the requirement.

## Selection Criteria

### Academic Achievement and Aptitude

Because veterinary medical education requires strong academic abilities, 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 of 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, whether applicants take the group paper-and-pencil test or the computer-based testing program. 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 preveterinary course requirements.

All prerequisite courses must be completed with at least a grade of C. It is possible to have up to 7 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 are sent directly to the College of Veterinary Medicine Admissions Office from all colleges and universities attended.

| | *Minimum Semester Credits* | *Minimum Quarter Credits* |
|---|---|---|
| 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[3] (upper division) | 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 at Cornell University will satisfy this requirement.
[3]This should be a complete course in general biochemistry; half of a two-term sequence does not constitute a complete course.

### Experience Working with Animals and with the Veterinary Profession

Understanding the veterinary medical profession and proper animal care are important considerations, accounting for 20 percent of the evaluation. 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 are 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 nonacademic interests and abilities, as well as desirable personality characteristics such as reliability, honesty, good communication skills, and dedication to service. The evaluations and essay that accompany the application serve as indicators of these factors. These factors account for another 15 percent of the evaluation.

## Application Procedures

Application forms and detailed information may be obtained by writing to the Admissions Office, S1 006 Schurman Hall. Application materials will be ready for distribution July through October annually. The complete application material, application fee, and supporting documents must be submitted to the Admissions Office postmarked no later than November 1.

### University Requirements

Applicants accepted for admission are required to pay a matriculation 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 the 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 nonresident 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 United States.

### 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 one year. Reapplicants may request that documents from the prior year's application be reconsidered in the current application.

## 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 required courses must complete them by the end of the spring term before matriculation in the professional curriculum. The latest acceptable GRE test date for guaranteed admission is February of the year of application. Completed applications for guaranteed admission must be sent to the Admissions Office of the College of Veterinary Medicine with a postmark no later than April 1.

## Combined Programs

### Double Registration

Through a program of double registration, it is possible for D.V.M. students who completed their preveterinary 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 advisers.

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

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

**July 15:** Applications available.

**October:** Latest GRE test date for regular admission.

**November 1:** All Cornell College of Veterinary Medicine 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). VMCAS applications are also due on this date and will be subject to a supplemental application form and fee.

**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 Office (607-253-3700).

# The D.V.M. Curriculum

## Classes of 1997–1999

The College of Veterinary Medicine at Cornell University introduced a new veterinary medical curriculum in 1993. The curriculum is comprised of two types of courses. Foundation courses, constituting approximately 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 that 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 that fulfill a specific educational need or area of interest.

## Class of 1996

The traditional Doctor of Veterinary Medicine academic program remains in effect for the class of 1996. It is organized in a core-selective format with approximately 90 percent comprised of required core courses. In addition, students are required to complete satisfactorily a minimum of 14 selective credits (2 credits in year one and 4 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 lectures and associated laboratories. Subjects taught in the third year are primarily related to the clinical sciences. Some courses, such as 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.

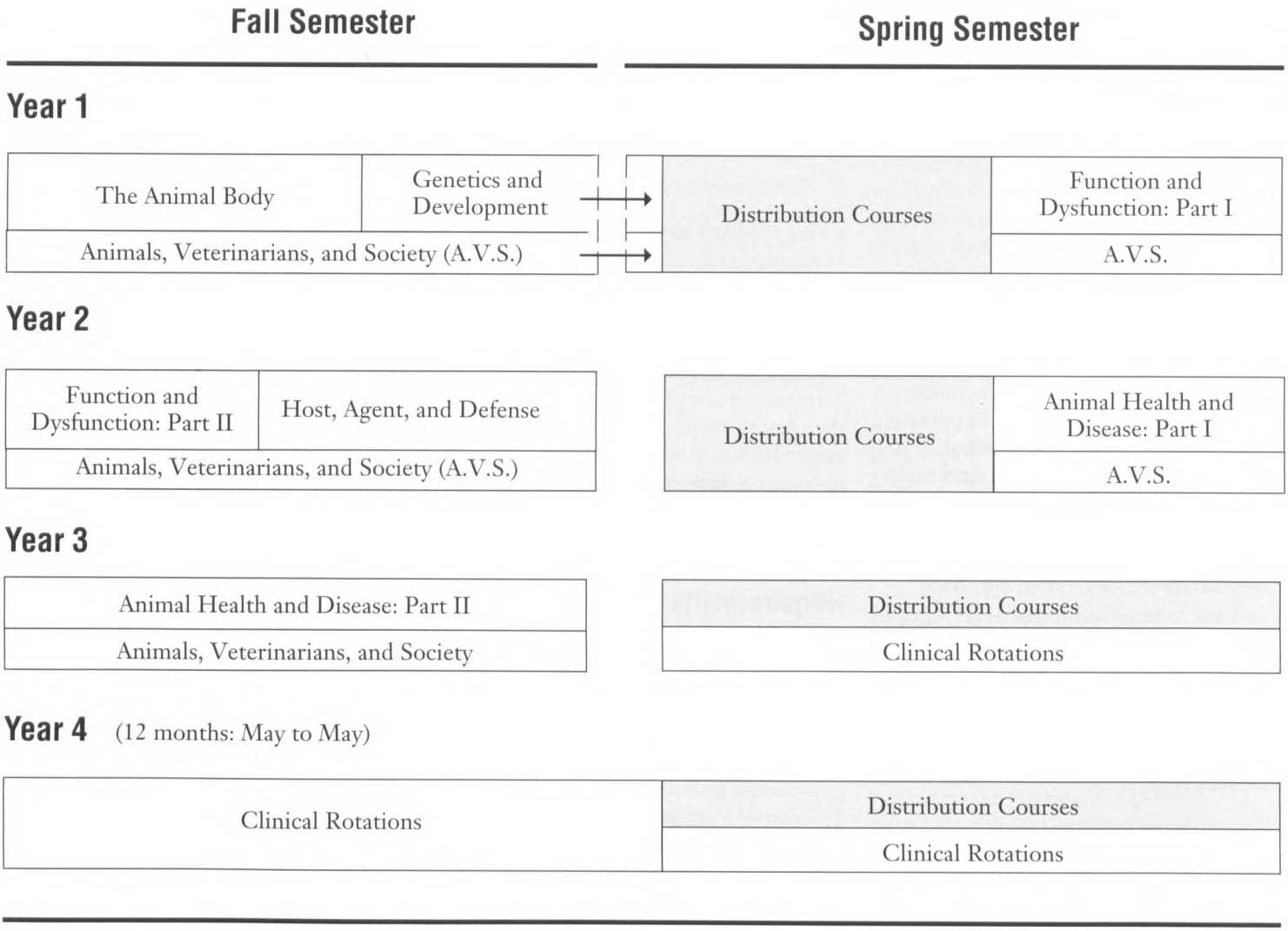
## Use of Animals in the Curriculum

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 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 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. Curriculum (Classes of 1999, 1998, and 1997)




## Year 1

| *Fall Term* | | *Credits* |
|---|---|---|
| VTMED 510 | The Animal Body | 12 |
| VTMED 517 | Animals, Veterinarians, and Society: Part A | 1 |
| VTMED 520 | Genetics and Development* | – |
| VTMED 527 | Animals, Veterinarians, and Society: Part B* | – |
| | | 13 |

| *Spring Term* | | *Credits* |
|---|---|---|
| VTMED 520 | Genetics and Development | 8 |
| VTMED 527 | Animals, Veterinarians, and Society: Part B | 1 |
| VTMED 521 | Neuroanatomy and Clinical Neurology | 3 |
| (variable) | Distribution Courses | 7 |
| VTMED 530 | Function and Dysfunction: Part I | 9 |
| VTMED 537 | Animals, Veterinarians, and Society: Part $C_1$ | 1 |
| | | 29 |

*Course continues into the spring semester

### Year 2

| *Fall Term* | | *Credits* |
|---|---|---|
| VTMED 531 | Function and Dysfunction: Part II | 7 |
| VTMED 538 | Animals, Veterinarians, and Society: Part $C_2$ | 1 |
| VTMED 540 | Host, Agent, and Defense | 12 |
| VTMED 547 | Animals, Veterinarians, and Society: Part D | 1 |
| | | 21 |

| *Spring Term* | | *Credits* |
|---|---|---|
| (variable) | Distribution Courses | 10 |
| VTMED 550 | Animal Health and Disease: Part I | 10 |
| VTMED 557 | Animals, Veterinarians, and Society: Part E* | — |
| | | 20 |

### Year 3

| *Fall Term* | | *Credits* |
|---|---|---|
| VTMED 551 | Animal Health and Disease: Part II | 20 |
| VTMED 557 | Animals, Veterinarians, and Society: Part E | 1 |
| | | 21 |

| *Spring Term* | | *Credits* |
|---|---|---|
| (variable) | Distribution Courses | 10 |
| VTMED 560 | Clinical Rotations | 2–10 |
| | | 12–20 |

*Course continues in the third year, fall semester

# Summary of D.V.M. Curriculum (Class of 1996)

### Year 4† (Class of 1996)

| *Required* | | *Credits* |
|---|---|---|
| VETPA 540 | Pathology Service | 2 |
| VETCS 572 | Senior Seminar | 1 |
| VETCS 574 | Large Animal Surgery Service | 4 |
| VETCS 575 | Ambulatory Service | 4 |
| VETCS 578 | Clinical Anesthesiology | 3 |
| VETCS 580 | Radiology Service | 2 |
| VETCS 589 | Small Animal Medicine and Community Practice Services | 6 |
| VETCS 591 | Small Animal Surgery Service | 4 |
| VETCS 593 | Ophthalmology Service | 2 |
| VETCS 594 | Large Animal Medicine Service | 3 |
| VETCS 598 | Dermatology Service | 2 |
| | | 33‡ |

| *Selectives* | | |
|---|---|---|
| VETCS 547 | Practice Management | 2 |
| VETPA 549 | Laboratory Animal Clinical Rotation | 2 |
| VETCS 570 | Theriogenology Service | 2–4 |
| VETCS 596 | Opportunities in Veterinary Medicine | variable |

†The academic calendar for fourth-year students includes the summer months following year three. This allows fourth-year clinical rotations and selective courses to be scheduled over a twelve-month period (May to May). 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 required 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:

### Foundation/Core Courses

The college registrar's staff automatically enrolls each student in required courses.

### Distribution Courses

Before the start of each term, the list of courses to be offered and the Distribution Course Enrollment Form are distributed by the Office of the College Registrar. After choosing 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 that should include all foundation and 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)

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 that may not be waived by the college.

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 six weeks before 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 associate dean for academic programs. A leave of absence is granted for a specified time, after which the student is expected to resume course work. The associate 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. A college may, however, 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 associate dean for academic programs 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 associate dean for academic programs. 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 for the Class of 1996

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 reenroll 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 |
| A | = | 4.0 |
| A– | = | 3.7 |
| B+ | = | 3.3 |
| B | = | 3.0 |
| B– | = | 2.7 |
| C+ | = | 2.3 |
| C | = | 2.0 |
| C– | = | 1.7 |
| D+ | = | 1.3 |
| D | = | 1.0 |
| 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.

## Grading Guidelines for the Classes of 1997–1999

*Currently under review by the faculty 1995–96*

Students will be evaluated at the end of each foundation and distribution course. A whole letter grade A through F (A, B, C, D, or F) will be awarded for each foundation course; either a whole letter grade or S/U (satisfactory or unsatisfactory) will be awarded for each distribution course. 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 A–F grading scale depending on the course objectives, course content, and the nature of assessment methods used. Quality point equivalents for grades of A to F are listed above.

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 for a course that has a letter grading system, 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; Satisfactory = C and above; 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 whenever appropriate.

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

## Academic Standards for the Classes of 1997–1999

### 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; the student will, however, 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 toward the minimum credit requirement for graduation or toward fulfilling minimum requirements for distribution courses from required sets. Furthermore, no more than four distribution courses with D grades will count toward the minimum credit requirements for graduation.

### Repeating a Semester

A student who has been denied permission to advance may repeat only 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 unusual 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; request 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.

[1]Directory information is a category of personally identifiable information that includes name, home address, local address, local telephone listing, dates of attendance at Cornell, major fields 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.

[2]Copies 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 $13,080 for New York State residents and $17,610 for nonresidents for the 1995–96 academic year. Most students in the college do not live in university housing. The cost of room and board in Ithaca for 1995–96 is estimated at $6,460. Required books, instruments, and supplies cost approximately $760 a year. An additional allowance of $3,710 should cover student health insurance (estimated at about $700), clothing, laundry, local transportation (including approximately $250 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 are 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 1995–96 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 $14,000 per year, depending on documented need. The average award was $13,600 in 1994–95. 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 purpose of allocating gift aid, the college also uses a supplemental 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 supplemental forms processor) 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. Application 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 Direct Stafford/Ford Loan Program (FDSL), Federal Perkins Loan Program (FPL), Health Professions Student Loan Program (HPSL), Federal Direct Unsubsidized Stafford/Ford Loan Program (FDUSL), and Health Education Assistance Loan Program (HEAL).

Repayment of principal on the Health Professions, Federal Perkins, and Federal Direct Stafford/Ford loans is totally deferred while the student is enrolled at least half-time in an eligible educational program. Interest on Federal Direct Unsubsidized Stafford/Ford and Health Education Assistance loans accrues from the date of disbursement. Interest rates vary according to the source of the loan. The table on page 15 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 (D.V.M. '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 that are not guaranteed by the government. Application is made directly to the Auxiliary to the AVMA.

# Summary of Loan Programs

| | *FDSL** | *FPL†* | *HPSL†* | *FDUSL** | *HEAL* |
|---|---|---|---|---|---|
| Annual Maximum | $8,500 | $5,000 | Tuition + $2,500 | $18,500 less FDSL amount | Unmet need |
| Aggregate Maximum | $65,000 | $30,000 | None | $138,500 less total FDSL | None |
| Interest Rate | T-bill +3.1%<br>Max 8.25% | 5% | 5% | T-Bill +3.1%<br>Max 8.25% | T-Bill +3.25%<br>No Max |
| Eligibility Evaluation | FAFSA, no parental data | FASFA, no parental data | FAFSA *with* parental data | FAFSA, no parental data | FAFSA, no parental data |
| In-School Repayment | None | None | None | Interest, *or* may capitalize | Interest, *or* may capitalize |
| Origination Fee | 3% | None | None | 3% | None |
| Insurance Premium Fee | up to 1% | None | None | up to 1% | 6–8% |
| Grace Period | 6 months | 6 months | 1 year | If have FDSL, 6 months, principal only | 9 months |
| Minimum Monthly Repayment | $50 | $40 | $15 | May be graduated | May be graduated |
| Maximum Years to Repay | 10 | 10 | 10 | 10 | 25 |

Deferments *(see below)*. Refer to your copies of loan documents to determine which of the possible reasons for deferment listed below are allowable. The deferments allowed vary between one loan program and another and may vary within any given loan program from one year to the next.

**Deferments**

1. At least half-time attendance
2. Limited period of unemployment
3. Limited period of economic hardship
4. Graduate or postgraduate fellowship–supported study outside United States
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 United States

*Lender is the United States Government. Loan promissory notes for signature will be distributed through the college.
†Lender is Cornell University. Loan promissory notes for signature will be distributed through the college.

Repayment of these loans is guaranteed by the federal government in the event of the borrower's death or total disability before 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. Remember that regulations governing any given loan program are subject to change at any time and that levels of funding and loan terms for various programs may vary from year to year.

# 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. 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 coeducational 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 twelve-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.

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 the official organization representing veterinary students at Cornell. The national veterinary medical student organization is SAVMA, and is the only recognized voice of veterinary students to universities, to AVMA and state veterinary organizations, and to the state and federal governments.

SCAVMA sponsors many social and educational activities. SCAVMA is becoming increasingly 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 adviser. 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 AVMA Insurance Trust and to receive a one-year free membership in 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

**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**

**IAAAM**
International Association of Aquatic Animal Medicine

**MEVSA**
Multi-Ethnic Veterinary Student Association

**SCAVAR**
Student Chapter Association of Veterinarians for Animal Rights

**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
- Common Environment Committee
- Faculty-Student Liaison Committee
- Honor Board
- International Advisory Committee
- Student Curriculum 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

Students of the College of Veterinary Medicine are eligible for three honor societies.

**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.

**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.

### 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 advisers assist with questions concerning academic progress and career goals within the profession. In addition, the associate dean for academic programs provides assistance in resolving academic problems and personal difficulties that affect students' achievement.

## 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 twenty-four 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.

To make a medical appointment, call 255-6958 or go to the center. For an appointment with Psychological Services, call 255-5208 or go to the offices at the center. A doctor is on call for urgent problems twenty-four 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 the responsibility of each student 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, S1 006 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.

The placement service also compiles national and state board information and collects and distributes employment statistics.

## Services for Persons with Disabilities

Cornell University is committed to assisting those persons with disabilities who have special needs. To obtain a brochure describing services for persons with disabilities write 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 licenses from the states in which they locate their practices. These licenses are 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 sixty days before the scheduled date. Requests for 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 Projects

The International Advisory Committee makes funds available on a competitive basis to D.V.M. students 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 Dr. S. Gordon Campbell, Department of Microbiology and Immunology.

### 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 academic programs.

### Leadership Program for Veterinary Students

For the past five years, the College of Veterinary Medicine at Cornell has hosted a leadership program for veterinary students. The program targets gifted students from veterinary colleges throughout the world who aspire to leadership positions in academic institutions, government, or industry. Major objectives of the program are to develop leadership skills in the participating students and to acquaint them with career opportunities for veterinarians; to assist them in their professional development; and to establish a network that will encourage interaction among students later in their careers. Approximately twenty fellowships are offered each year. Successful candidates typically stand in the top 10 percent of their veterinary college class, many have had research experience, and all have distinguished themselves in a wide range of professional and personal pursuits.

Fellowships enable students to spend ten 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 a stipend; free in-residence housing; research experience, career counseling and group discussions of leadership, ethics, and graduate education; and visits to the research facilities of NIH and the USDA.

Application forms for admission to the 1996 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 cosponsored 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. For more information contact Aquavet Associate Director, Dr. Paul Bowser, Department of Microbiology and Immunology.

## High School Students

### Explorations in Veterinary Medicine

Cornell University Summer College offers a six-week program for high school juniors or seniors 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. Participants have the opportunity to meet current veterinary students and faculty involved in a variety of research and clinical programs. In addition, they take a freshman writing course and choose one or more courses from those offered by the summer college. Students successfully completing the program receive college credit and 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, College of Human Ecology, and 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 Pacific Islander are eligible to apply. Application forms and further information may be requested from the Office of Student Services, S1 006 Schurman Hall.

**Members of the class of 1998 in a first-year microscopic anatomy laboratory session for the foundation course *The Animal Body*. Left to right: Mary Ann Sanfilippo, Christopher Byron, Isaac Mayo, and Victoria Olson.**

# The Graduate School

## Graduate Education

Graduate education at the College of Veterinary Medicine is administered by the Graduate School. 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, Immunology, and Pharmacology 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 degree 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.

Before a student can be considered 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.

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; students may, however, register in the college during the fall and spring terms and then register in the Graduate School during the summer semester. By doing so, they can earn ½ 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 supervision of faculty members who are nationally competitive research scientists and experienced mentors. 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 or teaching assistantships. Students are seldom admitted to a graduate field without assurance that funding is available for the duration of their graduate studies.

Research 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 twenty assistantships are reserved for applicants with the D.V.M. degree. These are awarded annually following a collegewide competition and are funded at a level comparable to that of other schools of veterinary medicine. 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 rotation enables 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 $10,650 a year) and a minimum salary of $20,730 a year with yearly increments. Decisions on the awards are made in early spring of the year before fall matriculation. The deadline for submission of college D.V.M. graduate fellowship applications is December 15, 1995.

Assistantship recipients are also eligible to enroll in the college's Graduate Program for Veterinary Clinician Scientists or the Graduate Program in Cellular and Molecular Medicine. The two programs target individuals who aspire to careers as nationally competitive research scientists. Successful applicants become eligible for stipend supplements, training-related benefits, or both through an annual competition. Program guidelines may be obtained from the Graduate Education Office.

Graduate School fellowships are also available. These are awarded following a university-wide competition. Only the strongest candidates are nominated by their respective fields. The deadline for submission of Graduate School Fellowship applications is January 10, 1996.

## Graduate Record Examinations

The graduate fields at Cornell have varying requirements regarding the Graduate Record Examination (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 on 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**
Professor Karel A. Schat
Levine Laboratory
607-253-3364

**Field of Biochemistry**
Professor Gerald W. Feigensen
107 Biotechnology Building
607-255-4744

**Field of Environmental Toxicology**
Professor Andrew Yen
T3 021B Veterinary Research Tower
607-253-3354

**Field of Immunology**
Professor Judith A. Appleton
James A. Baker Institute
607-256-5648

**Field of Microbiology**
Professor Stephen H. Zinder
W221 Wing Hall
607-255-2415

**Field of Neurobiology and Behavior**
Professor Thomas Seeley
W301 Seeley Mudd
607-255-6754

**Field of Pharmacology**
Professor Clare M. S. Fewtrell
S1 026A Schurman Hall
607-253-3870

**Field of Physiology**
Professor John F. Wootton
T8 022 Veterinary Research Tower
607-253-3465

**Field of Zoology**
Professor John W. Hermanson
S2 064 Schurman Hall
607-253-3542

# Internships and Residencies

## Internships

As funding allows, the Veterinary Medical Teaching Hospital offers 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 Small Animal Medicine and Surgery are assigned on a rotating basis to the Internal Medicine Service, Soft Tissue Surgery Service, Orthopedic Surgery Service, Community Practice Service, and 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, behavior, 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 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 also gain experience in professional veterinary medical education and in teaching. Residency programs provide training leading to a high level of specialized veterinary service to the public.

### Programs

Residency programs combine both clinical and academic activities. During the course of each program approximately 70 percent of 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, resident(s), intern(s), 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, behavior, dermatology, large animal internal medicine, small animal internal 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. In appropriate circumstances individuals are encouraged to pursue advanced academic training leading to the doctoral degree after completion of a residency.

### Residencies in Veterinary Pathology

The Department of Pathology supports separate residency training programs in anatomic and clinical pathology. These programs are designed to address a national need for veterinary diagnostic pathologists by providing an environment in which the trainee can acquire disciplinary skills and expertise in modern diagnostic and 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 rotations through specialty service laboratories in the Department of Pathology and the N.Y.S. Diagnostic Laboratory.

Summer program courses are conducted in immunohistochemistry, the use of molecular techniques in diagnostic pathology, laboratory animal pathology, and toxicologic pathology in which faculty from other universities frequently participate. Special courses include the Olafson Pathology Course and organ system workshops held annually with the faculty and students from the University of Guelph. The duration of training in either the anatomical or clinical track of the residency program is determined by the entry-level skill of the resident but generally lasts two to three years. Specialty board certification by the American College of Veterinary Pathologists is a goal of both residency training programs.

### Resident Program in Anatomic Pathology

Trainees will acquire considerable skill in the recognition and description of organ and tissue lesions, the formulation of morphologic diagnoses, the correlation of antemortem functional changes with postmortem structural alterations, and the conceptual approach to understanding the pathologic expression of a wide variety of disease processes affecting the common animal species.

### 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 service is provided for each resident. Residents develop their abilities to interpret laboratory results and morphologic patterns and to relate observations to pathologic and physiological 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.

# Academic Facilities and Resources

## 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 1992 it was renamed to recognize Dr. and Mrs. Isidor I. Sprecher for their generous support of the college. 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 sixty-six; 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 million 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 that includes the holdings of all campus libraries, an automated circulation system, and access to various network resources and databases, including Veterinary Information Network (VIN).

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 a table-of-contents service. In particular, the mediated computer-assisted literature search service, called COMPASS at Cornell, provides rapid access to numerous bibliographic databases using the skills and searching expertise of a trained reference librarian. MEDLINE, CAB ABSTRACTS, and BIOSIS are also available on CD-ROM for convenient searching of the biomedical literature. In addition, beginning in 1994, members of the college community can directly access MEDLINE and other biomedical databases located at the National Library of Medicine via Internet using GRATEFUL MED. Current awareness bibliographies can be generated each month through the on-line systems as well, including a networked version of REFERENCE UPDATE implemented in 1995.

The library's audiovisual collection contains more than 1,400 titles in slide, audiotape, and videotape format. Various image-based resources are also available to students on laser disc. These multimedia resources enhance academic programs as well as provide opportunities for self-study.

## Office of Educational Development

The Office of Educational Development (OED) has played a pivotal role in the development and implementation of the new academic program. It provides faculty development activities, administrative support for the foundation courses, and serves as a central source of course-related materials for students. It also sponsors new student orientation activities and informational sessions for matriculating students and provides workshops and other services that pertain to the improvement of study skills and learning strategies.

The new academic program is continually evolving. Course materials are regularly reviewed and revised, updated, and occasionally replaced. The OED provides a range of services to veterinary faculty in support of their teaching efforts. One important function of the office is the ongoing support and training for faculty tutors; another is the assistance it provides to faculty in generating course materials and other resources. The OED staff includes a curriculum specialist, a courseware developer, and a medical illustrator. The office sponsors a seminar series for faculty and course support staff on topics that pertain to teaching, learning, curriculum design, student assessment, and program evaluation. Other activities and services include workshops on innovative teaching methods; demonstrations and discussions of the use of educational technologies; tutor training workshops and ongoing support; consultations regarding student assessment and course evaluation; support for individual faculty members' professional development; and the development of curricular materi-

als. The OED staff have helped faculty to develop an extensive and expanding library of case-based exercises and computer courseware and provide medical illustrations for cases, modules, courseware, and scholarly publications. Faculty development activities continue to be important for sustaining the educational changes that distinguish the new curriculum, and the OED continues to sponsor numerous workshops for faculty on education, student learning, and the tutorial process.

The OED routinely seeks student assistance and input in developing and refining curricular materials and educational computer programs. Students have been integrally involved in developing the curricular materials used in the foundation courses. The course materials have been created to foster student autonomy and self-directed learning, and student input has been beneficial to the students and to faculty. Cases are written to generate a particular line of questioning; modules are developed as manipulative models and prompts to thinking more globally about a body region or system. They and the computer applications are intended to be as interactive as possible. For example, rather than traditional tutorial or drill-and-practice models of educational computing, courseware developed within the college involves simulations, animations, prediction tables, audio, and video. Development and evaluation of these materials by students has been an important element in the design and development process and has contributed to their success in classroom use. The OED helps to ensure curricular coherence and availability of the necessary support structures that faculty, staff, and students need for veterinary education of the highest quality.

## Kimball and Salmon Academies

When the new curriculum was instituted in 1993, two academic societies were created to strengthen advising and other student support systems. Named for Cornell's first male and female D.V.M. graduates, Daniel E. Salmon (D.V.M. 1876) and Florence Kimball (D.V.M. 1910), each academy is led by three faculty members: a director and two associate directors. The societies, which are open to all students and faculty, are designed to foster student-faculty interaction and to provide opportunities for career counseling, supplemental academic programming, and input and involvement in the new academic program. The Salmon Academy is located in the Veterinary Education Center, and the Kimball Academy is in Schurman Hall. Each room is designed for informal meetings and gatherings and is equipped with tables, couches, chairs, refrigerator, and microwave oven.

## Irving W. Wiswall Learning Laboratory

Located on the second floor of the Veterinary Education Center, the Wiswall Learning Laboratory (also known as the "dry lab") contains sixteen "Y"-shaped laboratory benches, each accommodating six students at three stations. Pairs of students share a dual-headed microscope and a networked computer at each workstation. The room is also furnished with portable radiographic viewers and video display equipment. Faculty and students working in this facility make use of a variety of integrated media, including interactive computer courseware, glass and film slides, analog and digital video, and audio.

## Modular Resource Center

Located on the second floor of Schurman Hall, the Modular Resource Center was developed to provide students with access to specialized learning resources to supplement classroom instruction and tutorial cases. Often described as a "walk-in atlas" or "visual library," the center consists of forty self-contained study stations, each with a defined educational purpose or set of learning issues (e.g., cranial nerve innervation to the head). The interactive learning resources at each station may include prepared, plastinated, and/or wet specimens; radiographs and viewers; models; illustrations; microscopes and slides; computer-generated images; and other materials. Brief text is provided to help students interact with the material. The modules are arranged in thematic clusters (cardiovascular, musculoskeletal, physical diagnosis) that emphasize comparative, pathological, and applied aspects of the subject matter. Developed by faculty and students, several of the modules have been funded by grants from the college's Alumni Unrestricted Gifts Fund.

## Tutorial Rooms

Located throughout Schurman Hall, fourteen rooms specifically designed for small-group tutorial sessions are equipped with blackboards, slide projectors, video equipment, radiographic viewers, flip charts, and reference books. The rooms are also available for independent and informal small-group study during afternoons and evenings.

# Collegewide Support Services

## Center for Research Animal Resources

Cornell University established the Center for Research Animal Resources (CRAR) in 1980. The center's director is responsible to the associate vice president for research. The center is responsible for 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 occupational 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 the college (multiuser) cell biology laboratory, which is equipped to develop, maintain, and store primary and transformed cell lines.

## 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 maintains a general-purpose local area network with central file and print services, access to university networking, and access to worldwide Internet.

# Professional Service and Outreach

## Veterinary Medical Teaching Hospital

The Veterinary Medical Teaching Hospital (VMTH) has three missions: teaching, research, and professional service. The setting of Cornell University in a major agricultural area facilitates the availability of a significant large animal caseload; the city of Ithaca and surrounding urban centers of Syracuse, Rochester, Albany, and Buffalo provide 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, third- and fourth-year students who spend much of the spring semester third year and the entire fourth year engaged in the various clinical services of the three service units: the Large Animal Clinic, Small Animal Clinic, and 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. The combined caseload in the small and large animal clinics exceeds 13,000 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 referral centers 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 service or extension 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 used by researchers at Cornell as well as other universities and private industry. Research areas include 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. Researchers in the Diagnostic Laboratory have also developed cloning and characterization of *Actinobacillus pleuropneumonia* RTX-toxin, *Pasteurella haemolytica*-like leukotoxin, *Borrelia burgdorferi* outer surface protein gene, and *Mycobacteria paratuberculosis* 34kDa protein genes. A PCR (polymerase chain reaction) has been developed for a quick diagnosis of Lyme and Johne's diseases.

An automated immunohistochemical staining process using 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 with the assistance of computer programs. Computer programs are being tested to aid in the study of the epidemiological spread of these and other diseases.

The New York State Department of Agriculture and Markets is designated by law as having the responsibility for

animal disease control. Therefore, a cooperative effort between Agriculture and Markets and the Diagnostic Laboratory was established. The two groups work jointly offering programs that allow New York farmers to determine the prevalence of Johne's disease and bluetongue in cattle, sheep, goat, deer, and llama herds and bovine leukosis in cattle. Participants in these programs are provided management assistance and state-subsidized testing to eradicate these diseases and eventually to achieve certified-free status. Programs are also available to aid in the eradication of ovine progressive pneumonia (OPP) in sheep and caprine arthritis encephalitis (CAE) in goats. 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 under state and federal government specifications, certifying breeding mares and stallions to be free of CEM before 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 under way in Ithaca; two years of data show effective reduction of raccoon rabies cases within the vaccinated area. Proposals for experimental use of the conditionally licensed, biologically engineered oral vaccine, vaccinia-rabies glycoprotein (V-RG vaccine) in areas of New York State have been developed in consultation with the N.Y.S. Departments of Agriculture and Markets, Health, and Environmental Conservation and are awaiting funding from state and other sources. Bait formulation, distribution, and preference for eventual oral vaccination of raccoons are being studied.

## 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 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.

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

This unique mastitis control program was established in 1946 and is the largest in the country and in the world. It serves New York State dairy farmers, veterinary practitioners, and the whole milk industry from four regional laboratories strategically located in Cobleskill, Geneseo, Ithaca, and Potsdam. A computer network and a telecommunication-fax system are used to provide rapid communication between laboratories. Dairy farmers from neighboring states that ship milk to New York milk plants also benefit from QMPS services. Of the 9,400 New York State dairy farms, approximately 2,500 are visited annually by QMPS personnel, and approximately 150,000 milk samples are aseptically collected for bacteriological diagnosis of mastitis. Milking equipment evaluation, milking and dry cow management, housing conditions, equipment maintenance, and mastitis control practices are discussed and recorded. When culture results have been completed, a comprehensive report is developed, including recommendations, based on all available information. This report is then sent to the dairy farmer and his or her veterinarian. Dairy farmers who are enrolled in the Dairy Herd Improvement Association (DHIA) have a further advantage in that those records are combined with the herd survey information. All information is then used to monitor the herd and make recommendations for improved management and mastitis control. The QMPS also offers card and tube agglutination testing for brucellosis at the regional laboratories located in Cobleskill, Geneseo, and Potsdam.

The QMPS is making major contributions in the diagnosis, prevention, control, and treatment of several causes of mastitis, including agents such as *Streptococcus agalactiae*, *Staphylococcus aureus*, *Mycoplasma*, *Streptococcus sp.*, *Staphylococcus sp.*, and coliform bacteria. Research continues on new methods of mastitis diagnosis, epidemiology, financial effects, nonantibiotic therapy, bacterins, and association with stray voltage.

# Species-Oriented Programs and Facilities

## Avian and Aquatic Animal Programs

The Department of Microbiology and Immunology carries out multidisciplinary research programs in avian and aquatic animal medicine that encourage 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. A 39-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 on Snyder Hill. These flocks provide chickens and embryos free of infectious pathogens and antibodies for use in experimental studies. The new Veterinary Medical Center contains seven isolation units designed specifically to house fish for 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. The department operates a fish diagnostic laboratory designed to provide assistance to aquaculturalists and others experiencing problems with fish health.

## James A. Baker Institute for Animal Health

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

The institute comprises the Cornell Research Laboratory for Diseases of Dogs, the Center for Canine Genetics and Reproduction, and the Cornell Equine Genetics Center. The institute's original mission was to prevent loss from infectious diseases in animals. While maintaining that primary focus, the institute has grown to incorporate programs in arthritis, immunogenetics, reproduction, and inherited eye diseases. A limited number of graduate students, postdoctoral fellows, and visiting investigators are accepted for advanced training in those fields. Projects conducted here also involve recombinant DNA techniques, cell hybridization, embryo manipulation, and gene mapping.

In recent years, facilities have been renovated and expanded to accommodate increased program activity using 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, the McConville Barn for equine reproductive studies, a new laboratory complex for the study of inherited canine diseases, and a conference center/visiting scholar residence.

## 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 Performance Testing Clinic

The Equine Performance Testing Clinic (EPTC) is the foundation of the college's program in equine sports medicine. The centerpiece of the clinic is a high-speed treadmill capable of generating speeds in excess of 30 miles per hour. The clinic facility also includes examination areas and laboratory spaces containing sophisticated monitoring equipment.

The EPTC has greatly improved the ability of college veterinarians to diagnose and treat patients with respiratory problems, lameness, or other conditions contributing to poor performance. Additionally, the facility permits college veterinarians to conduct sophisticated research on important diseases affecting the performance of the equine athlete. These research activities increase our basic knowledge of physiological or pathological changes associated with high-intensity exercise.

## Equine Research Park

The Equine Research Park, situated on 165 acres of land about one mile from the college, includes stall facilities for ninety horses and ponies and shed facilities for sixty horses. The park contains a half-mile track, stallion barn, and separate brood mare barn that includes box stalls 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.

## 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

Hunter R. Rawlings III, *president*

Don M. Randel, *provost*

Robert Michels, *provost for medical affairs*

Frederick A. Rogers, *senior vice president and chief financial officer*

Henrik N. Dullea, *vice president for university relations*

Ronald G. Ehrenberg, *vice president for academic programs and planning*

H. David Lambert, *vice president for information technologies*

Susan H. Murphy, *vice president for student and academic services*

Norman R. Scott, *vice president for research and advanced studies*

Joycelyn R. Hart, *associate vice president for human relations*

James J. Mingle, *university counsel and secretary of the corporation*

Inge T. Reichenbach, *acting vice president for public affairs*

Peter C. Stein, *dean of the university faculty*

## College Administration

Franklin M. Loew, *dean*

Donald F. Smith, *associate dean for academic programs*

Douglas D. McGregor, *associate dean for research and graduate education*

John A. Lambert, *assistant dean for administration*

Timothy T. Redden, *assistant dean for public affairs*

Roger J. Avery, *chair, Department of Microbiology and Immunology*

Cornelia E. Farnum, *chair, Department of Anatomy*

Bendicht U. Pauli, *chair, Department of Pathology*

David Robertshaw, *chair, Department of Physiology*

Geoffrey W. G. Sharp, *chair, Department of Pharmacology*

Maurice E. White, *chair, Department of Clinical Sciences*

Douglas F. Antczak, *director, James A. Baker Institute for Animal Health*

Francis A. Kallfelz, *director, Veterinary Medical Teaching Hospital*

Donald H. Lein, *director, Diagnostic Laboratory*

Linda L. Carr, *director of budget management*

Gloria R. Crissey, *director of financial aid; registrar*

Katherine M. Edmondson, *director of educational development*

Robert O. Gilbert, *director, Cornell Bovine Research Center*

John M. Lewkowicz, *director of computing services*

George A. Maylin, *director, Equine Drug Testing Program*

Joseph M. Piekunka, *director of admissions*

H. Edward Quay, Jr., *director of college human resources services*

Fred W. Quimby, *director, Center for Research Animal Resources*

John E. Saidla, *director of continuing education*

Fredric W. Scott, *director, Cornell Feline Health Center*

Larry J. Thompson, *director of biosafety*

Susanne K. Whitaker, *librarian, Flower-Sprecher Veterinary Library*

Elizabeth A. Fontana, *coordinator of communication services*

## Faculty

### Anatomy

**Professors**

Cummings, John F., DVM, MS, PhD; James Law Professor of Veterinary Anatomy

de Lahunta, Alexander, DVM, PhD, Dipl ACVIM; James Law Professor of Veterinary Anatomy

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

Noden, Drew M., PhD; anatomy

**Associate Professors**

Hermanson, John W., MS, PhD; anatomy

Suarez, Susan S., MS, PhD; anatomy

**Assistant Professor**

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

**Senior Lecturer**

Mizer, Linda A., DVM, MS, PhD; anatomy

**Lecturer**

Hackett, M. Susan, DVM; anatomy

**Instructors**

Boatwright, Celeste E., DVM

Dawson, Susan D., PhD; anatomy

Eirmann, Laura, DVM

**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

## Clinical Sciences

### Professors

Erb, Hollis N., DVM, MS, PhD; epidemiology

Hintz, Harold F., MS, PhD; animal nutrition; College of Agriculture and Life Sciences (joint appointment)

Kallfelz, Francis A., DVM, PhD, Dipl ACVN; medicine; director, Veterinary Medical Teaching Hospital

Kollias, George V., DVM, PhD, Dipl ACZM; Jay Hyman Professor of Wildlife Medicine

Loew, Franklin M., DVM, PhD; dean of the college

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 academic programs

Tennant, Bud C., DVM, Dipl ACVIM; James Law Professor of Comparative Medicine

White, Maurice E., DVM; medicine; chair of the Department of Clinical Sciences

### 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, Dipl ACVA; anesthesiology

Grohn, Yrjo T., BVSc, DVM, MPVM, MS, PhD; epidemiology

Guard, Charles, PhD, DVM; 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 M., 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

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

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

Simpson, Kenneth W., BVM&S, PhD, MRCVS, Dipl ACVIM, Dipl ECVIM; medicine

Todhunter, Rory J., BVSc, MS, PhD, Dipl ACVS; surgery

### Instructors

Gentz, Edward J., MS, DVM; wildlife medicine

Irby, Nita, DVM, Dipl ACVO; ophthalmology

Linn, Kathleen A., DVM, MS; surgery

### Emeritus Faculty Members

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

Hillman, Robert B., DVM, MS, Dipl ACT; theriogenology; senior clinician emeritus

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

Norcross, Neil L., MS, PhD; immunology

Postle, Donald S., DVM, MS; veterinary science

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

Schryver, Herbert F., DVM, PhD; nutrition

### Adjunct and Courtesy Faculty Members

Arnoczky, Stephen P., DVM, Dipl ACVS; surgery

Chader, Gerald J., PhD; ophthalmology

del Cerro, Manuel, MD; ophthalmology

Devine, Terence M., MD; ophthalmology

Fredrickson, Bruce E., MD; comparative orthopedics

van Veen, Theo, MS, PhD; ophthalmology

## Diagnostic Laboratory

**Professors**

Henion, John D., MS, PhD; toxicology

Reimers, Thomas J., MS, PhD; endocrinology

**Associate Professors**

Dubovi, Edward J., MS, PhD; microbiology

Jacobson, Richard H., MS, PhD; immunoparasitology

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

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

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**

Catalfamo, James, MS, PhD; comparative hematology

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

Wade, Susan E., MA, PhD; parasitology

**Senior Extension Associates**

Bennett, Gary J., DVM; Diagnostic Laboratory, QMPS, Potsdam

Brooks, Marjory, DVM; comparative hematology

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

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

Rossiter, Christine, MS, DVM

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

Schulte, Hal F., III, MS, DVM; QMPS, Geneseo

Stehman, Susan M., MS, VMD

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

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

**Field Veterinarian**

Julius, Frederic S., DVM; QMPS, Cobleskill

**Adjunct Faculty Members**

House, James A., DVM, MS, PhD

Torres, Alphonso, DVM, MS, PhD

## James A. Baker Institute for Animal Health

Department affiliation is noted in parentheses.

**Professors**

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

Antczak, Douglas F., VMD, PhD; immunology; Dorothy Havemeyer McConville Professor of Equine Medicine; director, Baker Institute (Microbiology and Immunology)

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

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

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

Lust, George, PhD; physiological chemistry (Microbiology and Immunology)

**Associate Professors**

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

Meyers-Wallen, Vicki N., VMD, PhD, Dipl ACT; comparative medical sciences (Anatomy)

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

**Assistant Professors**

MacLeod, James N., VMD, PhD; molecular genetics (Physiology)

Ray, Jharna, MS, PhD; biochemistry (Physiology)

**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; Alfred H. Caspary Professor of Nutrition, emeritus

## Microbiology and Immunology

**Professors**

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

Bloom, Stephen E., MS, PhD; avian medicine

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

Campbell, S. Gordon, MVSc, PhD; microbiology

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

Naqi, Syed A., BVSc, MS, PhD, Dipl ACVM; avian medicine

Schat, Karel A., DVM, PhD; avian medicine

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

**Associate Professors**

Bowman, Dwight D., MS, PhD; parasitology

Casey, James W., PhD; virology

**Assistant Professors**
Baines, Joel D., VMD, PhD; virology

Denkers, Eric, PhD; immunology

Holzschu, Don L., MS, PhD; microbiology

Pearce, Edward J., PhD; immunology and parasitology

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

Tullson, Elaine D., PhD; microbiology

**Senior Extension Associate**
Lucio-Martinez, Benjamin, DVM, MS, PhD; avian medicine

**Senior Lecturer**
Winter, Lola E., MS; microbiology

**Senior Research Associates**
Barr, Margaret C., DVM, PhD; veterinary medicine

Golemboski, Karen A., PhD

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

Shawky, Samia, DVM, PhD; avian medicine

**Instructor**
Davies, Christopher J., DVM, PhD

**Emeritus Faculty Members**
Bruner, Dorsey W., PhD, DVM, Dipl ACVM, ABM; microbiology

Calnek, Bruce W., DVM, MS, Dipl ACVM, Dipl ACPV; avian medicine; Rudolph J. and Katharine L. Steffen Professor of Veterinary Medicine

Cole, Randall K., PhD; avian medicine

Fabricant, Julius, VMD, MS, PhD; avian medicine

Georgi, Jay R., DVM, PhD; parasitology

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

Hitchner, Stephen B., VMD, Dipl ACVM; avian medicine

Leibovitz, Louis, VMD; aquatic animal medicine

Noronha, Fernando M., DVM; virology

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

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

**Adjunct and Courtesy Faculty Members**
Blissard, Gary W., MS, PhD

Rumsey, Gary L., MS, PhD; avian and aquatic medicine

Schachte, John, MS, PhD; aquatic animal medicine

## Pathology

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

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

Krook, Lennart P., DVM, PhD; pathology

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

Minor, Ronald R., VMD, PhD; pathology

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

Phemister, Robert D., DVM, PhD, Dipl ACVP; pathology

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

Yen, Andrew, MS, PhD; pathology

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

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

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

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

**Assistant Professors**
Guan, Jun-Lin, PhD; pathology

Levine, Roy, MA, PhD; pathology

Valentine, Beth A., DVM, PhD; pathology

Winand, Nena J., MS, DVM, PhD; pathology

**Instructor**
Stokol, Tracy, ClinPathol, BVSC, MRCVS

**Senior Research Associate**
Abdel-Ghany, Mossaad, MSc, PhD

**Research Associates**
Elble, Randolph C., PhD

Wootton, Joyce, PhD

**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**
Donnelly, Thomas, BVSc, Dipl ACLAM; laboratory animal medicine

Nguyen, H. T., VMD, Dipl ACLAM, Dipl ACVP

Nosanchuk, Jerome S., MD; clinical pathology

Posso, Manuel, MD; comparative pathology

Suter, Maja, DVM, PhD, Dipl ACVP; pathology

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

**Joint Faculty Appointment**
Shalloway, David, MS, PhD (Biochemistry, Molecular, and Cell Biology)

**Postdoctoral Fellows**
Appeddu, Paul, PhD

Goodwin, Andrew PhD

Gruber, A. D., DVM, PhD

Imanishi, Noriaki, PhD

## 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, Department of Pharmacology

### Associate Professors

Fewtrell, Clare M. S., D Phil; pharmacology

Nowak, Linda M., PhD; pharmacology

Weiland, Gregory A., PhD; pharmacology

### Research Associates

Bagrodia, Shubha O., PhD

Erickson, Jon W., PhD

Flanders, James A., DVM

Gamett, Daniel, PhD

Komatsu, Mitsuhisa, PhD

Manor, Danny, PhD

Sen Singh, Ugra, PhD

### Postdoctoral Associates

Byrnes, W. Malcolm, PhD

Mulvaney, Jennifer, PhD

Straub, Susanne G., PhD

Wu, Wen Jin, M.D.

### Visiting Professors

Friedberg, Ilan, PhD

Noda, Mitsuhiko, M.D., M.Eng.

Rosas, Marcelo Jose Alfonzo, M.D., PhD

## 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, ScD, MD; James Law Professor of Reproductive Physiology

Quaroni, Andrea, PhD; physiology; College of Agriculture and Life Sciences

Robertshaw, David, BVMS, PhD; physiology; chair, 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

### Assistant Professor

Roberson, Mark S., MS, PhD; physiology

### Senior Lecturer

McFadden, Carol H., MAT, PhD; physiology

### Senior Research Associates

Concannon, Patrick W., MS, PhD; physiology

Fullmer, Curtis S., MNS, PhD; physiology

McDonald, Thomas, MS, PhD; physiology

Wentworth, Richard A., MS, PhD; physiology

### Lecturer

Rawson, Richard E., DVM, PhD; physiology

### Postdoctoral Associates

Giussani, Dino, BSc, PhD

Wandji, Serge, MSc, PhD

### 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

### Postdoctoral Fellow

Evans, Alexander, BSc, PhD

### Research Associate

Wu, Wen Xuan, MD, PhD

## College Advisory Council

Richard C. Grambow, DVM (chair)
Donald P. Berens
Robert W. Bitz (Trustee Emeritus)
Stephen J. Ettinger, DVM
Albert Fried, Jr.
Martha S. Gearhart, DVM
Ralph W. F. Hardy, PhD
John Patrick Jordan, PhD
John L. Mara, DVM
Robert R. Marshak, DVM
Anne E. McElroy, PhD
Mark L. Morris, Jr., DVM, PhD
Bernard W. Potter (Trustee Emeritus)
Kenneth J. Rotondo, DVM
James L. Seward
Richard J. Sheehan, DVM
David Shepherd
Patricia L. Thomson, DVM
Kent R. Van Kampen, DVM, PhD
Patricia Wehle
Bruce Widger, DVM
(Trustee Emeritus)
William E. Zitek, DVM
Harold M. Zweighaft, DVM
Stephen H. Weiss (Trustee)

## Elected Committees

**General Committee**
S. G. Campbell, Chair (1994–97)
S. L. Fubini (1995–98)
R. H. Jacobson (1993–96)
B. C. Tennant (1995–98)
J. F. Wootton (1994–97)

**University Appeals Panel**
J. T. Blue (1994–99)
H. J. Harvey (1990–95)
T. J. Reimers (1991–96)
T. J. Summers (1992–97)
W. S. Schwark (1993–98)

**Curriculum Committee**
T. J. Divers (1992–94), chair
D. D. Bowman (1995–97)
K. M. Edmondson, ex officio
R. O. Gilbert (1993–95)
K. A. Houpt (1995–97)
R. Levine (1994–96)
T. J. Reimers (1993–95)
D. F. Smith, ex officio
J. M. Spitsbergen (1994–96)
S. S. Suarez (1995–97)
B. C. Tennant (1995–97)
G. A. Weiland, nonvoting

**Faculty Council of Representatives**
J. D. Baines (1995–98)
J. A. E. Bertram (1994–97)
B. J. Cooper (1995–98)
E. J. Dubovi (1993–96)
C. E. Farnum (1995–98)
F. A. Kallfelz (1993–96)
J. F. Randolph (1993–96)

## Appointed Committees

**Academic Council**
D. F. Smith, Chair

**Admissions Committee**
H. N. Erb, Chair

**Affirmative Action Committee**
C. M. S. Fewtrell, Pharmacology, Chair

**Biohazard Safety Committee**
E. J. Dubovi, Chair

**College Research Council**
A. J. Winter, Chair (1994–96)

**Committee for Students Denied Reregistration**
R. C. Riis, Chair

**Committee for the Use of Live Animals in Teaching**
P. W. Concannon, Chair

**Common Environment Committee**
T. J. Reimers, Chair

**Computer Advisory Committee**
R. E. Oswald, Chair

**Continuing Education Committee**
J. E. Saidla, Chair

**Emeritus Professors Advisory Committee**
W. O. Sack, Chair

**Faculty Honor Code Committee**

**International Advisory Committee**
S. G. Campbell, Chair

**Library Committee**
T. R. Houpt, Chair

**Modular Resource Center Committee**
L. A. Mizer, Chair

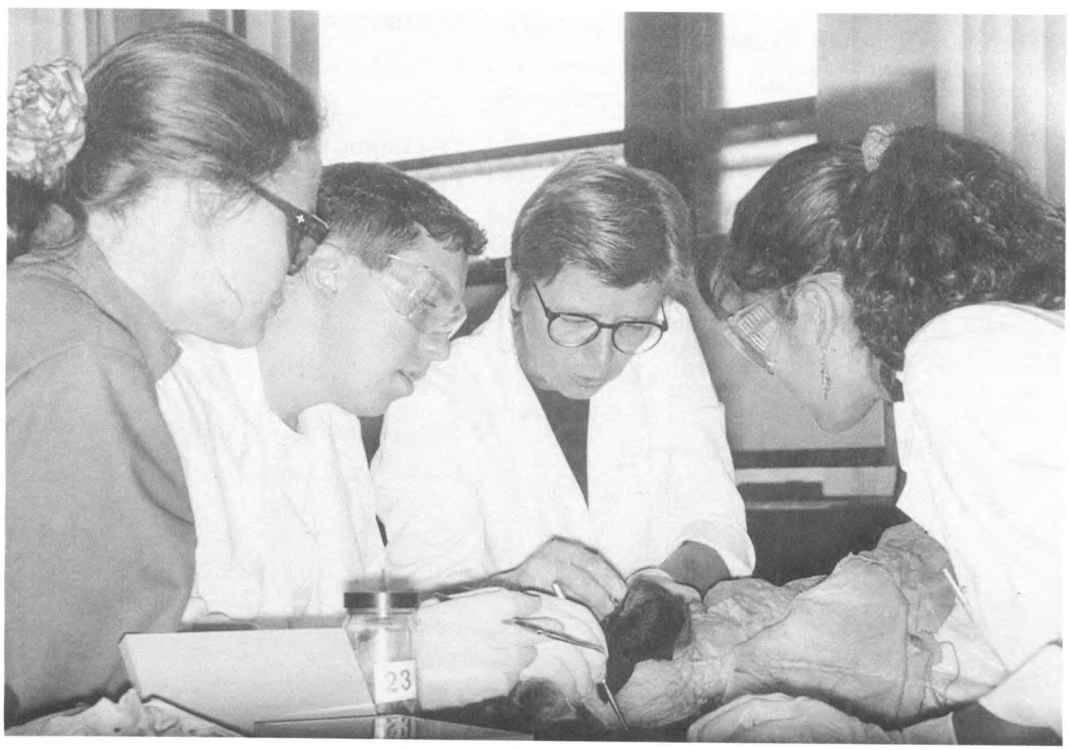
**Oversight Committee for Conflicts of Interest/Commitment**
D. D. McGregor, Chair

**Scholarship Committee**
H. J. Harvey, Chair

**Senior Seminar Committee**
F. H. Fox, Chair

In 1995 two college faculty members received national recognition for their outstanding work in teaching from the Student American Veterinary Medical Association (SAVMA). Each year, SAVMA reviews nominations from veterinary students across the country and honors just two faculty members with their awards. Students at Cornell wrote detailed applications to describe Dr. John E. Saidla's and Dr. M. Susan Hackett's contributions to veterinary education, as well as their enthusiasm for interacting with the student body.

**Dr. John E. Saidla received the 1995 SAVMA Teaching Excellence Award in the Clinical Sciences. He is the course leader for the foundation course "Animals, Veterinarians, and Society" and is shown here with first-year students Rachel Smith '98 (left) and Sara Robinson '98 in a laboratory session on physical examinations.**



**Dr. M. Susan Hackett received the 1995 Teaching Excellence Award in the Basic Sciences. A lecturer in the Department of Anatomy, in this photo she is working with first-year students in a gross anatomy laboratory session for the foundation course "The Animal Body." Left to right: Sara Sanders '98, John Farrelly '98, Dr. Hackett, and Sandra Wu '98.**

# Description of Courses

**NOTE:** Courses listed in brackets [ ] are approved courses that are not offered during the 1995–96 academic year.

## Foundation Courses (Classes of 1997–1999)

In foundation courses I, II, III, and IV (VTMED 510, 520, 530, 531, 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, three to four 2-hour tutorial sessions are scheduled each week. These are complemented by lectures, laboratories, and discussion sessions or other organized learning opportunities specific to the individual course. Faculty are available to respond to questions that 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 that 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. 12 credits. Limited to first-year veterinary students. Letter grades only. J. F. Cummings (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 based on tutorials with significant emphasis on practical laboratories. Lectures and modules complement student learning.

### VTMED 517 Physical Examination. Animals, Veterinarians, and Society: Part A (Foundation Course VIIa)

Fall. 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 systems. 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 selected diagnostic procedures such as venipuncture and cystocentesis.

### VTMED 520 Genetics and Development (Foundation Course II)

Fall and spring. 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 operating during mammalian development and adulthood. Four basic processes—cell proliferation, cell movement, cell differentiation, and morphogenesis—are essential to all living systems but may be regulated differently in embryonic and mature cells and tissues. Tutorial cases are used to initiate explorations of the mechanisms that regulate these processes in embryonic, normal adult, and transformed (cancer) cell populations. Tutorial sessions are complemented by lectures, laboratories, minicase discussions, and modules.

### VTMED 521 Neuroanatomy and Clinical Neurology

Spring. 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 anatomic 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 and videotapes 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 527 Biomedical Ethics and Clinical Genetics. Animals, Veterinarians, and Society: Part B (Foundation Course VIIb)

Fall and spring. 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 related to animal genetics, animal welfare, use of animals in research, clinical application of genetics, the current state of genetic screening, and the broad application of ethics in society. Students meet for one 2-hour session each week.

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

Spring. 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 531 Function and Dysfunction: Part II (Foundation Course IIIb)

Fall. 7 credits. Limited to second-year veterinary students. Prerequisite: VTMED 530 Function and Dysfunction: Part I. Letter grades only. B. J. Cooper (course leader) and others.

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

### VTMED 537 Clinical Interviewing and Communication Skills. Animals, Veterinarians, and Society: Part $C_1$ (Foundation Course VIIc)

Spring. 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 communicate effectively with clients. In addition, students will be provided an opportunity to study the human-animal bond, animal death, and grief counseling. This course also provides opportunities to practice client interviewing skills and to participate in a standardized client and patient encounter.

### VTMED 538 Information Management and Diversity. Animals, Veterinarians, and Society: Part $C_2$ (Foundation Course VIIc, continued)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisite: VTMED 537 Animals, Veterinarians, and Society: Part $C_1$. Letter grades only. J. E. Saidla (course leader) and others.

This course is the correlate for VTMED 531 Function and Dysfunction, Part II. This course provides for understanding the importance of the medical record, the diversity of clients, employees, and society in general, and a session on alternative medicine and its various practices. Studying how to critically read and evaluate clinical studies and journal articles is also provided.

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

Fall. 12 credits. Limited to second-year veterinary students. Prerequisite: VTMED 531 Function and Dysfunction: Part II. Letter grades only. D. D. Bowman (course leader) and others.

This course is divided into six sections: the host response, intracellular environment, extracellular environment, somatic environment, external environment, and 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 Health Maintenance and Clinical Veterinary Public Health. Animals, Veterinarians, and Society: Part D (Foundation Course VIId)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisite: VTMED 538 Animals, Veterinarians, and Society: Part $C_2$. 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 maintaining health in single animals or populations of animals. Topics will include animal bites, nosocomial infections, rabies control programs, vaccines and vaccine reactions, zoonotic diseases, and integrated health maintenance programs.

### VTMED 550 Animal Health and Disease: Part I (Foundation Course V)

Spring. 10 credits. Limited to second-year veterinary students. Prerequisite: VTMED 540 Host, Agent, and Defense. Letter grades only. R. O. Gilbert.

This course integrates the clinical sciences of medicine, surgery, anesthesiology, radiology, and theriogenology, which are themselves integrated subjects, with systems pathology and relevant aspects of applied pharmacology. The course will be presented on a systems basis moving from clinical signs of alteration in function, to pathophysiology of clinical signs, to strategies for diagnosis and treatment. Specific examples will be used to establish a cognitive framework and knowledge of the most important diseases. This course will provide a sound foundation for clinical rotations in Foundation Course VI. It builds upon the strengths developed in earlier courses by an increased exposure to case examples in a more directed way, taking advantage of the diversity of skills and special knowledge of both faculty and students. A variety of educational tech-

niques will be used, including lectures in which interaction is encouraged, laboratories, demonstrations, case discussions, and autotutorials.

### VTMED 551 Animal Health and Disease: Part II (Foundation Course V, continued)

Fall. 20 credits. Limited to third-year veterinary students. Prerequisite: VTMED 550 Animal Health and Disease: Part I. Letter grades only. R. O. Gilbert (course leader) and others.

A continuation of VTMED 550 Animal Health and Disease: Part I.

### VTMED 557 Professional Regulation. Animals, Veterinarians and Society: Part E (Foundation Course VIIe)

Spring semester second year continuing into fall semester third year. 1 credit. Prerequisite: VTMED 547 Animals, Veterinarians, and Society: Part D. Letter grade only. J. E. Saidla (course leader) and others.

This course is a correlate with Foundation Course V, Animal Health and Disease. This course examines governmental regulation of the veterinary profession, including proper drug usage, extra label drug use, controlled substances, substance abuse, professional liability, professional conduct, hazardous materials in the workplace, and environmental issues. Also included will be sessions relating to controlling and preventing the spread of animal diseases.

### VTMED 560 Clinical Rotations (Foundation Course VI)

Spring semester third year, and fall and spring fourth year. Letter grades only. R. P. Hackett (course leader) and others. Prerequisite VTMED 551 Animal Health and Disease: Part II.

Subject to faculty approval 1995–96.

## Distribution Courses (Classes of 1997–1999)

Distribution courses comprise 30 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. More courses will be added during 1995–96.

***Grades:*** Grading options for all distribution courses (letter or S/U) to be approved by faculty 1995–96.

### VTMED 601 Anatomy of the Carnivore

Spring. 3 credits. Prerequisite: VTMED 510 The Animal Body or permission of the instructor. 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. J. W. Hermanson.

The topographic anatomy of the horse is studied by dissection, concentrating on regions and topics that are of particular biologic and clinical interest. Dissection and discussion are 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. 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, predissected specimens, and postmortem specimens. Students will be required to complete an independent study project on a relevant subject of their choice.

### VTMED 604 Mechanics of Animal Movement

Spring. 2 credits. Open to veterinary students, graduate students, and qualified undergraduates with permission of the instructor. J. E. A. Bertram.

This course explores the mechanical factors that influence how movement occurs within animals. A conceptual approach to understanding the relationship between the animal and its performance is emphasized. The main focus will be on an analysis of whole animal locomotion and an exploration of the functional basis of gait and its abnormalities. This will be followed by investigation of functional features of the anatomical components that are involved with providing the capabilities for movement (both mechanical and physiological). The class operates in a discussion format, meeting two evenings per week. Four hands-on labs demonstrating how biomechanical research is conducted are distributed throughout the eight-week course. Assessment involves weekly short quizzes and a final term paper.

### VTMED 605 Comparative Anatomy: Pattern and Function

Spring. 3 credits. Prerequisite: VTMED 510 The Animal Body. 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 606 Advanced Clinical Neurology

*(subject to faculty approval 1995–96)*

Spring. 1 credit. Prerequisite: first two semesters of veterinary curriculum. 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.

### VTMED 607 The Literature of Natural History

Spring. 1 credit. H. E. Evans.

This course is an introduction to the classic and current literature and bibliographic materials relating 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 primates. The approach will be phylogenetic with roundtable discussions of available materials in a classroom or library. Information useful for investigations at the interface of biology and veterinary medicine will be emphasized.

### VTMED 608 Seminars in Comparative Anatomy

Spring. 1 credit. J. E. A. Bertram.

Students will attend and provide a written review of the weekly seminars in VTMED 605 Comparative Anatomy: Pattern and Function. The course is available to students who may or may not have previously enrolled in VTMED 605.

### VTMED 610 Veterinary Aspects of Avian Biology

Spring. 1 credit. Minimum enrollment: 10; maximum enrollment: 30. 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 interested in developing clinical skills with birds.

### VTMED 611 Fish Health Management

Spring. 1 credit. Minimum enrollment: 8; maximum enrollment: 16. Veterinary students or permission of instructor. 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

Spring. 1 credit. Minimum enrollment: 8; maximum enrollment: 32. Veterinary students or permission of instructor. P. R. Bowser.

This is a lecture and laboratory course dealing with procedures and practices involved in management of aquarium systems. Topics 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 613 Aquavet I: Introduction to Aquatic Veterinary Medicine

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. 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, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service. It is designed to introduce veterinary students to 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 thirty-five individuals who are leaders in their respective fields of aquatic animal medicine. Students present seminars on appropriate topics.

### VTMED 614 Aquavet II: Comparative Pathology of Aquatic Animals

Two weeks of full-time instruction at Woods Hole, Massachusetts, immediately after the spring term. 2 credits. Maximum enrollment: 18. Prerequisites: formal course work in diseases of aquatic animals or appropriate experience and permission of the instructor. 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, Woods Hole Oceanographic Institution, and 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 twelve individuals who are leaders in their respective fields of aquatic animal medicine.

### [VTMED 615 Veterinary Medicine in Developing Nations

Spring. 2 credits. Maximum enrollment: 20. Primarily for veterinary students; others by permission of instructor. K. A. Schat.

Veterinary medicine has an important role to play in developing nations in (a) developing and providing economical sources of animal proteins for human consumption and (b) protecting ecological resources. This seminar course will provide interested veterinary students with information on and insight in the multitude of complex issues facing U.S. veterinarians working in developing nations.]

### VTMED 620 Molecular Biology and Immunology of Host-Parasite Interactions (also VTMI 702)

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

The primary objective of this lecture course is 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.

### [VTMED 621 Neuroendocrine-Immune Interactions (also VETMI 721)

Spring, odd-numbered years. 1 credit. For second-, third-, and fourth-year veterinary students. J. A. Marsh.

This five-week course is designed to provide the veterinary student with additional understanding of the functioning of the immune system, with an emphasis on the integration of immune development and function into the overall physiologic status of the organism. The student should gain an understanding that manipulation of either endocrine or immune organs has more far-reaching effects than just on the affected system. Major topics include: immunoregulatory activities of the neuroendocrine system; the cytokines—hormones or immune mediators; endocrine products of the immune system—functional or fictional; and neuroendocrine aspects of age-related changes in immune function.]

### VTMED 622 Foreign Infectious Diseases of Animals

Spring. 1 credit. Minimum enrollment: 6. For second-, third, and fourth-year veterinary students. M. J. Appel.

This course describes the etiology, pathogenesis, clinical signs, gross pathology, differential diagnosis, methods of spread, reservoir hosts, and control of foreign animal diseases that resemble indigenous infectious diseases and present serious economic threats to the United States.

### VTMED 623 The Pathogenesis of Significant Bacterial Infections of Large Domestic Animals

Spring. 1 credit. Maximum enrollment: 24; minimum: 12. For second-, third-, and fourth-year veterinary students. S. G. Campbell.

This course will require two contact hours per week for eight weeks thus: One contact hour in a lecture format to summarize the current canon of important, selected information about significant bacterial diseases of large domesticated animals in a logical fashion and to emphasize the pivotal events in pathogenesis, including, where appropriate, ecology, colonization, virulence, invasion, evasion, host reaction, lesion production, and resolution.

A second contact hour will be used as follows:

50 percent—local expert to focus on an important aspect of the above, e.g., treatment, clinical aspects, diagnosis, current problem, to bring reality and expertise to bear on the subject and to answer questions.

50 percent—a group of three students to present the results of their original explorations into the particular week's infection. This might include an update of information, an in-depth look at one aspect of pathogenesis, or an intellectual attack on the current dogma about pathogenesis, treatment, or diagnosis.

### VTMED 624 Feline Infectious Diseases

Spring. 1 credit. For second-, third-, and fourth-year veterinary students. F. S. Scott.

This course will provide an opportunity for the student to understand and discuss the etiology, transmission, diagnosis, treatment, and prevention of various feline infectious diseases that are important to practicing veterinarians. Diseases to be discussed include feline panleukopenia, feline respiratory diseases, feline leukemia, feline immunodeficiency virus, feline infectious peritonitis, rabies, systemic mycotic infections, and various bacterial infections.

### VTMED 625 Osteoarthritis

Spring. 1 credit. Maximum enrollment: 16. G. Lust.

This course provides a basis at the molecular, cellular, and tissue levels for understanding the function of mammalian diarthrodial joints. It includes a description of a diarthrodial joint and the detailed composition and metabolism of bone, articular cartilage, ligaments, meniscus, capsule, and synovium. The interrelationship of synovium, synovial fluid, joint lubrication, articular cartilage, simple biomechanical considerations, and enervation are described to address joint function. A comprehensive discussion of the osteoarthritis that inextricably is associated with hip dysplasia in dogs serves as a basis for the etiopathogenesis of this disease. Osteoarthritis in joints of cats, dogs, horses, pigs, sheep, and cows also are discussed in detail as is osteochondrosis.

Consideration also is given to infectious arthritis and also human joint diseases such as gout and pseudogout. The role of pain receptors, a brief discussion of therapy such as the role of nonsteroidal anti-inflammatory drugs, glucocorticoids, and mention of possible corrective surgery procedures are included.

### VTMED 630 Clinical Biostatistics for Journal Readers

Spring, alternate years. 1–1.5 credits. Minimum enrollment: 6; maximum enrollment: 20. 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

Fall and spring. 1 credit. Senior Seminar Committee.

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

### VTMED 633 Introduction to Nontraditional Companion and Laboratory Animals

Spring. 1 credit. Minimum enrollment: 10; maximum enrollment: 30. 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 nontraditional species commonly seen as companion and laboratory animals: rodents, lagomorphs, reptiles, amphibians, birds, goats, llamas, potbellied pigs, miniature horses, and primates. 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 in which techniques of observation, restraint, and physical examination are practiced.

### VTMED 634 Introduction to Large Animal Ambulatory Practice

Fall, spring, and summer. 1 credit. For first- and second-year veterinary students. M. E. White (coordinator).

This course introduces veterinary students to primary care large animal ambulatory practice and herd health management through direct exposure to the 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 five days of clinical service.

### VTMED 635 Introduction to the Professional Literature

Spring. 1 credit. Minimum enrollment: 6; maximum enrollment: 20. 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 637 Introduction to Community Practice Service

Fall, spring, and summer. 1 credit. 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 ten half-days of clinical service.

### VTMED 638 Physiological Nutrition

Spring. 1 credit. Minimum enrollment: 10; maximum: 90. For second-year veterinary students; others by permission of instructor. A. J. Reynolds.

This course will provide information on the evaluation and formulation of rations for large and small animals. These concepts will be applied in discussion on the nutrition requirements of these animals during maintenance, gestation, lactation, growth, stress, and aging. The course is recommended for all second-year veterinary students who do not have a strong background in ruminant, equine, canine, and feline nutrition. This course, or its equivalent, will be necessary for comprehension of clinical nutrition concepts in Foundation Course V.

### VTMED 639 Veterinary Dentistry

Spring. 1 credit. Maximum enrollment: 48. For second-, third-, and fourth-year veterinary students. J. E. Saidla.

This course introduces veterinary students to the basics of small animal dentistry. Practical aspects of routine dental care are emphasized. Laboratory sessions follow the specific topic and provide hands-on experiences. Working in pairs, students gain experience in the technical aspects of instrumentation and manipulative skills necessary to perform basic dental procedures. Canine and feline skulls and heads are used in the laboratory sessions; live animals are not used.

### VTMED 640 Veterinary Aspects of Captive Wildlife Management

Spring. 2 credits. All years. G. V. Kollias.

This course will concentrate on principles of captive wildlife management, both clinical and nonclinical. Students will be challenged to learn and integrate a variety of disciplines that are essential to successfully managing wildlife in a captive or semi–free-ranging environment. These disciplines include but are not limited to species-specific (1) behavior and behavioral requirements, (2) nutritional requirements and problems, (3) natural history, (4) commercial, zoonotic, and toxicological problems, (5) physical and chemical restraint and anesthesia, (6) preventive medicine, (7) clinical laboratory medicine, and (8) medical and legal ethics.

### VTMED 641 Approaches to Problems in Canine Infectious Diseases

Spring. 1 credit. Maximum enrollment: 60; minimum: 10. For second-, third-, and fourth-year veterinary students. S. C. Barr.

Students will work through four cases in canine infectious diseases using a specifically designed computer software program. The course consists of two 50-minute discussion periods a week and working on cases at a computer terminal through the week on the student's own time. The course will emphasize the approach to clinical medical problems generally and infectious diseases specifically. The overall objective is to give future small animal practitioners skills in the approach to clinical problems with specific emphasis placed on history taking, clinical signs and

examination skills, assessment of clinicopathology data and diagnostic materials (radiographs and ultrasound images), treatment plans, and prevention. The course expands knowledge gained in Foundation Course IV and under the instruction of a clinical faculty member and is aimed at facilitating the use of that knowledge into the practical skills of managing clinical cases encountered in practice. A basic level of computer literacy is advised but not required.

### VTMED 642 Management of Fluid and Electrolyte Disorders

Spring. 2 credits. Minimum enrollment: 20. For second-, third-, and fourth-year veterinary students. D. F. Smith.

Students will focus on clinical manifestations and the pathophysiologic mechanisms associated with metabolic acid base disturbances and associated fluid and electrolyte abnormalities in domestic animals. The course is divided into segments dealing with metabolic acidosis, metabolic alkalosis, mixed acid-base disturbances, clinical management of fluid and electrolyte disturbances, use of hypertonic saline, and the concept of strong ion difference.

### VTMED 643 Fundamental Aspects of Embryo Transfer

Spring. 1 credit. Maximum enrollment: 16. Third- and fourth-year students. R. Gilbert.

This course provides an introduction to the theory and practice of embryo transfer in domestic animals. Topics include background, advantages and disadvantages, superovulation, embryo recovery techniques, embryo culture and manipulation, embryo transfer techniques, registration of offspring, import and export, and related areas. Students are exposed to practical techniques of embryo transfer in cattle, small ruminants, horses, and swine. Theoretical aspects of embryo transfer are taught in a lecture format (30 percent). Demonstration of surgical and other techniques occupies approximately 20 percent of the course. Approximately 50 percent of the course is lab time during which students practice techniques of embryo recovery, evaluation, handling, and transfer.

### VTMED 644 Techniques in Equine Surgery

*(subject to faculty approval 1995–96)*

Winter. 1 credit. Limited to third- and fourth-year veterinary students. S. L. Fubini (coordinator) and other large-animal surgeons.

This course consists of six laboratories performing surgical procedures on ponies and cadaver specimens. 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 students anticipating equine practice after graduation. This course is offered during a two-week period over winter intersession.

### VTMED 645 Techniques in Food Animal Surgery

*(subject to faculty approval 1995–96)*

Winter. 1 credit. Limited to third- and fourth-year veterinary students. S. L. Fubini (coordinator) and other large-animal surgeons.

This course consists of four laboratories performing surgical procedures on sheep, calves, cadaver specimens, and adult cattle. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with 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 during a two-week period over winter intersession.

### VTMED 646 Llama Tutorial

*(subject to faculty approval 1995–96)*

Fall, spring, summer. 1 credit. Limited to second-, third-, and fourth-year veterinary students. 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.

### [VTMED 650 Veterinary Parasitology (Large Animal)

Spring, odd-numbered years. 1 credit. All students. D. Bowman.

This course provides a basic introduction to large animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and metazoan parasites. Emphasis will be given to parasites representative of significant disease processes or of significant economic importance to veterinarians, clients, and producers. The course will elaborate on the biology and pathogenesis of these major pathogens with the ultimate goal being to maximize the recognition of the major disease manifestations induced by the different groups of pathogens through examples of each of the different groups of organisms.]

### [VTMED 660 Twenty Questions on ECM (Extracellular Matrix)

Spring. 1 credit. R. R. Minor.

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

### VTMED 661 Surgical Pathology

Spring, summer, fall. 1 credit. For second-, third-, and fourth-year veterinary students. B. A. Valentine.

This two-week course (approximately four hours per day) will provide "hands-on" experience in the Surgical Pathology Service of the Department of Pathology. Students will assist in tissue selection and sample submission and in trimming and preparing specimens. Working with residents and the attending pathologist, they will examine tissue specimens histologically, propose diagnoses, and discuss their interpretations.

### VTMED 662 The Bottom Line

Fall and spring. 1 credit. R. Lewis.

This course provides case analysis of material submitted to the necropsy service. Gross and microscopic lesions for each disease/condition are emphasized and correlated with relevant antemortem findings. When appropriate, pathogenetic mechanisms, epidemiology, etiology, prevention, and treatment are included in the discussion.

A written assessment of one of the "bottom line" cases will serve as the basis for student evaluation.

### VTMED 663 Wildlife Pathology

Spring. 1 credit. J. King.

This course introduces students to common and important lesions of wild species of animals. The etiology and pathogenesis of diseases of importance to wildlife are discussed. Slide presentations of lesions are made, and they are discussed by an experienced pathologist.

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

### VTMED 670 Drug Handling in the Body

Spring. 0.5 credit. Maximum enrollment: 60. For second-, third-, and fourth-year veterinary students. R. A. Cerione.

This course will provide an in-depth consideration of the pharmacological principles of administration, adsorption, distribution, metabolism, and elimination of drugs. Emphasis will be on the conceptual basis of the pharmacokinetic considerations in the therapeutic use of drugs. The course will build on the pharmacological and physiological principles learned in Foundation Course III. The course will include independent study pharmacokinetic exercises using interactive computer courseware.

### [VTMED 671 Autonomic Pharmacology

Spring, alternate years. 0.5 credit. Maximum enrollment: 30. For second-, third-, and fourth-year veterinary students. G. A. Weiland.

This course will provide an in-depth consideration of the pharmacological and physiological principles of autonomic pharmacology. Molecular, cellular, and organ system mechanisms will be emphasized. The course will explore in more detail the fundamental pharmacological and physiological principles of the effects of drugs on autonomic organs covered in Foundation Course III. The course will incorporate use of the interactive computer program, SymPharm.]

### VTMED 672 Antimicrobial Drug Therapy in Veterinary Medicine

Spring. 1 credit. For second-, third-, and fourth-year DVM students. W. S. Schwark.

The objective of this course is to familiarize students with antimicrobial drugs used in veterinary practice. The course will build on fundamental pharmacological and microbiological principles covered in Foundation Courses III and IV and will consider antibacterial, antifungal, antiparasitic, and antiviral drugs from the point of view of unique pharmacokinetic properties, indications for clinical use, and potential toxicities as the basis for rational use.

### [VTMED 673 Growth Factor–Coupled Signal Transduction

Spring, alternate years. 0.5 credit. R. A. Cerione.

This course will present basic information regarding the regulation of cell growth and differentiation. The emphasis will be on the signal transduction pathways that are responsible for translating growth factor binding at the cell surface into nuclear responses and mitogenesis. The course should complement cases covered in Foundation Course II and tie together the biochemical pathways underlying cell growth with biological processes such as wound healing and disease states such as cancer.]

### [VTMED 674 Physiology and Pharmacology in the Understanding and Treatment of Diabetes

Spring, alternate years. 1 credit. Maximum enrollment: 24. G. Sharp.

This course will cover the basic causes of the manifestations of diabetes, signal transduction mechanisms controlling insulin secretion and insulin action, and the principles underlying current and potential future treatment for this group of diseases. The course will stress the value of basic research into cellular and molecular mechanisms for the treatment and cure of disease.]

### VTMED 680 Behavior Problems of Horses

Spring. 1 credit. Maximum enrollment: 24. 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. 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

Spring. 1 credit. Maximum enrollment: 30. 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 Bio S 715)

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

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

### [VTMED 683 Fundamentals of Electrodiagnostics

Spring, odd-numbered years. 2 credits. Maximum enrollment: 20. For second-, third-, and fourth-year veterinary students. E. R. Loew.

This course will review the basic mechanisms of electrical activity in biological systems and introduce the techniques and instrumentation used to record these electrical signals from the animal body. The techniques to be introduced include electrocardiogram, electroretinogram, electrooculogram, electromyogram, electroencephalogram, brain auditory evoked response, and nerve conduction velocity.]

### VTMED 684 Thermal Regulation and Exercise (also BioS 713)

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.

### VTMED 685 Physiology of Pregnancy

Spring. 2 credits. Maximum enrollment: 20. For second-, third-, and fourth-year veterinary students. P. W. Nathanielsz.

This course is presented in lecture fashion, with weekly assignments consisting of one major reference per lecture and a numerical data handling problem related to that week's work. Subjects covered are placental function, growth, central nervous system development, fetal breathing, biorhythms in maternal and fetal physiology, parturition, and adaptations to newborn life.

### [VTMED 686 Proteolysis in Physiological Function and Dysfunction (also BIOAP 717)

Spring, alternate years. 1 credit. For second-, third-, and fourth-year veterinary students. J. F. Wootton.

This course, which uses a lecture and seminar format, deals with the role of proteolytic enzymes and related peptide hydrolases in physiological function and their regulation. Topics will include several of the following: comparative aspects of gastrointestinal, intracellular, and extracellular proteolysis in protein turnover; limited proteolysis in posttranslational processing and targeting of proteins; hemostasis; fibrosis and fibrinolysis; endocrine regulation; viral infectivity (e.g., AIDS); tumor metastasis; remodeling of cellular function; apoptosis.]

### [VTMED 687 Topics in the Physiology and Pathophysiology of the Digestive Tract: Simple Stomached Animals

Spring, alternate years. 1 credit. Maximum enrollment: 20. For second-, third-, and fourth-year veterinary students. T. R. Houpt.

A seminar course in which topics will be considered at a fundamental level based upon the current literature. A mix of brief lectures, student reports on research papers, and discussion by the group. Primarily gastrointestinal problems of dogs, cats, and pigs will be considered. Topics will be selected that are relevant to common clinical problems. Examples of topics are gastric secretion and the gastric mucosal barrier (Why doesn't the stomach digest itself?); pancreatic function and pancreatitis (Why doesn't the pancreas digest itself?); the enteric nervous system and ileus (How can the intestines become paralyzed?).]

### [VTMED 688 International Animal Agriculture

Spring, alternate years. 2 credits. D. Robertshaw.

This course will introduce students to the incidence and role of disease in animal production systems in developing countries. Agriculture is fundamental to the economy and economic stability of virtually all of these countries, and animal agriculture is an integral part of their systems ranging from the modest small ruminant farmer to large parastatal beef-dairy operations. The focus will be on the peasant farmer since the large operations are usually relatively well managed but represent only a very small component of the total agricultural economy. The scope will be broad and will serve only as an overview of the subject. The breadth of the suggested readings will provide those who are interested with an avenue for individual exploration.]

### VTMED 698 Special Projects in Veterinary Medicine

Fall, winter, spring, summer. Variable credit. Tenure track faculty, College of Veterinary Medicine.

This course provides the opportunity for students to work individually with a faculty member to pursue an area of particular interest and, typically, not part of the established curriculum. Specific course objectives and course content are flexible and reflect the scope and academic expertise of the faculty.

### VTMED 699 Research Opportunities in Veterinary Medicine

Fall, winter, spring, summer. Variable credit. Tenure track faculty, College of Veterinary Medicine.

This course provides the opportunity for individual students to work in the research environment of faculty involved in veterinary or biomedical research. Specific course objectives and course content are flexible and reflect the specific research environment.

# Core and Selective Courses (DVM Class of 1996) and Other Courses

## *Listed by department*

**NOTE:** Courses listed in brackets [ ] are approved courses that are not offered during the 1995–96 academic year.

## Clinical Sciences

Maurice E. White, chair
T5 027 Veterinary Research Tower
607-253-3570

### VETCS 547 Practice Management (Selective)

Summer. 2 credits. Two-week clinical rotation selective intended for fourth-year veterinary students. S/U grades only. J. E. Saidla.

Provides an introduction to the entire topic of practice, facility, and people management. Course participants form a veterinary group practice that 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 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 (coordinator).

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 evaluating endometrial biopsies, endometrial culturing, and collecting and evaluating 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 Science sheep and swine barns allow observation of breeding programs and provide experience in castration, docking, clipping milk teeth, and notching ears. 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. C. L. Guard (coordinator), 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, P. F. Moon.

This course is designed to provide clinical experience in the use of anesthetics in small companion animals, horses, and some food animals. The students participate in 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 for students to learn the skills necessary to perform safe anesthesia in a modern veterinary practice.

### 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 3-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 588 Cardiology Service (Selective)

Fall and spring. 2 credits. Limited to fourth-year veterinary students. Letter grades only. N. S. Moise.

### 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. E. Hornbuckle, V. N. Meyers-Wallen, N. S. Moise, J. A. Randolph (coordinator), K. W. Simpson.

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 590 Clinical Wildlife and Exotic Animal Medicine Service (Selective)

Fall, winter, spring, and summer. 2 credits. Limited to fourth-year veterinary students. Letter grades only. E. J. Gentz, G. V. Kollias.

### 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. E. J. Trotter (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; planning of therapy; and 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.

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, goniolenses, 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 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 (Selective)

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 evaluate each student formally.

### 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., 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 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 679 Dairy Herd Management and Health (Selective)

Fall. 2 credits. For fourth-year veterinary students. Maximum enrollment: 20. 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. M. C. Smith.

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 686 Goats: Management and Diseases (Selective)

Spring. 1 credit. For 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 690 Veterinary Dermatology (Selective)

Spring. 1 credit. Minimum enrollment: 10. Limited to fourth-year veterinary students. S/U grades only. W. H. Miller, Jr., 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 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, even-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 nonparametric 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.

## Diagnostic Laboratory

Donald H. Lein, director
D2 006 Diagnostic Laboratory
607-253-3900

### VETDL 611 Mastitis (Selective)

Fall or spring. 2 credits. Limited to fourth-year veterinary students. Letter grades only. R. Gonzalez, D. Wilson, 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 Promotion Services Program–Mastitis Control Program.

### 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 an M.S. degree.

## Microbiology and Immunology

Roger J. Avery, chair
T7 015 Veterinary Research Tower
607-253-3440

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

Fall. 3 credits. Strongly recommended: basic courses in microbiology, genetics, and biochemistry. S/U optional. 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, odd-numbered years. 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 408 Viruses and Disease (Undergraduate) (also Biological Sciences 408)

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). Recommended: VETMI 315, 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 431 Medical Parasitology (Undergraduate)

Fall, alternate years. 2 credits. Prerequisites: zoology or biology. Letter grades only. D. D. Bowman.

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

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

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

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

### VETMI 700 The Biology of Animal Viruses (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 nonstructural viral proteins, and the interactions between viruses and cells. 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 (Graduate)

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 (Graduate) (also VTMED 620)

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

See description for VTMED 620.

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

Spring, even-numbered years. 3 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. Letter grades only. R. G. Bell (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. D. Antczak, J. Appleton.

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 and Immunology. 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 or permission of instructor. S/U optional. R. G. Bell (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 (also VTMED 621) (Graduate)

Spring, odd-numbered years. 1 credit.

See description for VTMED 621.]

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

Spring, odd-numbered years. 1 credit. Prerequisite: VETMI 315 Basic Immunology 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 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.

### VETMI 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.

### 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
T3 016 Veterinary Research Tower
607-253-3300

### 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 (Selective)

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 conducted 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 637 Postmortem Pathology (Selective)

Fall and spring. 1 credit. Intended for 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 639 Autotutorial in Laboratory Animal Medicine and Science

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 audio-visual teaching aid, any of which may be selected by the student.

### VETPA 640 Principles of Toxicological Pathology

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 techniques and lesions found or produced.

### VETPA 641 Clinical Immunology

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

This course emphasizes the clinical aspects of fifteen specific diseases that are mediated by immunologic processes. Case material from the Teaching Hospital is used to illustrate 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 736 Metabolic Skeletal Diseases

Spring. 1 credit. For graduate students in pathology or nutrition and a selective course for fourth-year veterinary students. Lectures only. Letter grades only. L. P. Krook.

### VETPA 750 Cancer Cell Biology (also Biological Sciences 750) (Graduate)

Spring, even-numbered years. 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

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 and elsewhere 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 796 Medical Primatology

Fall, odd-numbered years. 1 credit. For residents and graduate students by permission of instructor. F. W. 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 nonhuman primate species; bacterial, viral, and parasitic diseases; noninfectious diseases; infant and nursery care reproduction and behavioral considerations; and therapeutics.

## Pharmacology

Geoffrey W. G. Sharp, chair
S1 074 Schurman Hall
607-253-3650

### VETPR 610 Cellular and Molecular Pharmacology

Fall, odd-numbered years. 3 credits. By permission of the instructors. G. A. Weiland and pharmacology faculty.

A graduate-level course covering basic principles of pharmacology, receptor mechanisms, and signal transduction pathways. Areas to be covered include autonomic and central nervous system pharmacology, pharmacology of inflammation, and chemotherapeutic approaches. Although the course emphasizes molecular and cellular mechanisms, several integrated organ systems will be discussed.

### [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 followed by discussion of recent papers from the literature.]

### [VETPR 701 Organ System Toxicology (also Toxicology 611)

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

A minicourse 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, 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 course emphasizes 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 and 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. 2 credits. Maximum enrollment: 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. Several 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, even-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 toward 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 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 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

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## Physiology

David Robertshaw, chair
T8 027 Veterinary Research Tower
607-253-3854

### [Bio S 214 Biological Basis of Sex Differences (Undergraduate)

Fall, even-numbered 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 nonreproductive 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.

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. Maximum enrollment: 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.

### 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.

### 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.

### 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. Six topics are offered in 1995–96:

### 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, laboratory demonstrations will be used to illustrate how some of these transport systems are experimentally studied.

### Bio S 713 Thermal Regulation and Exercise (also VTMED 684)

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, odd-numbered years. 1 credit. Undergraduate and graduate students. G. Lust.

One-hour lecture each week to be arranged.

### Bio S 712 Plasma Lipoprotein

Spring, even-numbered years. 1 credit. A. Bensadoun.

### Bio S 718 Evolution of Color

Spring, even-numbered years. 1 credit. E. Loew.

### [Bio S 711 Stress Physiology

Fall, even-numbered years. 1 credit. Prerequisite: Bio S 311 or equivalent. K. A. Houpt.

The emphasis is on the physiological assessment of stress, to be discussed as part of animal welfare.]

### [Bio S 712 Proteolysis in Physiological Function and Dysfunction

Spring, odd-numbered years. 1 credit. J. F. Wootton.

The course deals with the roles of proteolytic enzymes and related peptide hydrolases in physiological function and their regulation.]

### [Bio S 713 Cardiac Electrophysiology

Fall, even-numbered years. 1 credit. R. F. Gilmour.

The emphasis is on nonlinear dynamic aspects of cardiac electrophysiology and cardiac arrhythmias.]

### [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.]

### VETPH 346 Introductory Animal Physiology (also Bio S 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.

### VETPH 628 Graduate Research in Animal Physiology (Graduate) (also Bio S 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.

### 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 758 Molecular Mechanisms of Hormone Action (Graduate) (also Bio S 658)

Spring, even-numbered years. 2 credits. Prerequisite: permission of instructor. R. A. Corradino.

An advanced course developed from the current literature on endocrine mechanisms.

### VETPH 811 and 812 Advanced Physiology Methods I & II (also Bio S 811 and 812 (Graduate)

Fall and spring. 2 credits each. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only. P. Nathanielsz.

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 and methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

**Photography**

*Frank DiMeo, University Photography:* cover, title page
*Veterinary Biomedical Communications:* pages 20 and 38

## College of Veterinary Medicine
### Cornell University

Please send:

- ☐ Information on the summer high school program Explorations in Veterinary Medicine
- ☐ Information on the Minority High School Student Research Apprenticeship Program
- ☐ Application for admission (D.V.M.)
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- ☐ Catalog of the Graduate School

Please specify areas of interest: _____

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Cornell University
USPS 132-860
College of Veterinary Medicine
S1 006 Schurman Hall
Ithaca, NY 14853-6401

Second Class