INTRODUCTION

Approximately 100 faculty members in the Graduate Group in Comparative Pathology (GGCP) represent most of the departments that make up the Schools of Medicine and Veterinary Medicine. With such a broad range of interests represented, students have the opportunity to receive a uniquely diverse education in terms of course materials and a great variety of research areas that are supported by major instrumentation.

Graduate groups facilitate interdepartmental and interdisciplinary programs. Among the more than 80 graduate programs administered by the Office of Graduate Studies at UC Davis, more than half operated as such groups.

Successful completion of the GGCP program leads to either a master of science (MS) or doctor of philosophy (PhD). The majority of students in the program have a professional medical degree (i.e. DVM, MD, or DDS). Students without a professional degree are admitted if they have exceptionally strong interests and backgrounds in basic biomedical sciences. Students without a professional medical education will be required to take additional course work in comparative medicine and introductory pathology.

Although the graduate program may follow and overlap slightly with residency training, individuals with professional degrees should note that graduate education in comparative pathology is separate from any residency training program that is offered by the university.

GGCP is designed for students interested in studying mechanisms responsible for the development of diseases at the organismal, cellular or subcellular level. Students interested in cell biology, biochemistry, microbiology, pharmacology, physiology, immunology, or genetics should apply to the graduate programs in those subjects. Such students may, however, find that some courses taught by the faculty in comparative pathology to be of great interest.

ADMISSION REQUIREMENTS

Admission to the GGCP is generally open only for the Fall Quarter. It is the applicant’s responsibility to ensure that all application materials reach the GGCP by the appropriate application deadline of March 1 for International Students and April 1 for Domestic Students.
Because the program in comparative pathology is diverse, applicants must contact and obtain sponsorship of a faculty member in the group who is willing to serve as their major professor should they be admitted. The name of the faculty sponsor should be clearly identified on the application.

The applicant should also ask the faculty sponsor to write to the master adviser stating his/her willingness to serve as major professor if the applicant is accepted into the graduate program. Applicants without a specifically identified faculty sponsor/major professor will not be admitted into the program. Applicants needing assistance contacting faculty members with similar interests should write to the master adviser well in advance of the March/April 1 application deadlines. They should clearly state their interests and goals within the field of comparative pathology.

Scholastic Requirements
GPA of 3.0 or greater (on a 4.0 scale) for undergraduate courses. Applicants with a professional degree should also have a GPA of 3.0 or greater for courses taken during the first two years of the professional curriculum.

*Submission of GRE scores from the general test (verbal, quantitative, and analytical).

*The application deadline for international students is March 1. International students who have not studied at an institution where English was the language of instruction must obtain a score of 550 (written) or 213 (computer based) or more on the TOEFL before applying for admission.

UNDERGRADUATE PREPARATION FOR ADMISSION

For applicants without a professional medical degree, a strong background in biological sciences is essential. Applicants must have completed course work in the areas of organic chemistry (comparable to UC Davis courses CHE 8A and CHE 8B), physics (PHY 1A and PHY 1B), introduction to life sciences (BIS 1A, BIS 1B, and BIS 1C), and biochemistry (BIS 101, BIS 102, and BIS 103). It is recommended that applicants take some additional biomedical/life sciences courses in anatomy, histology, embryology, bacteriology, virology, parasitology, immunology and hematology.

Potential comparative pathology students who do not have a medical degree will be notified by the Master Adviser of any prerequisites to be taken before they are eligible to enroll in the required core courses. They may be accepted into the program provided their limited deficiencies can be corrected during the first year.

DEGREE REQUIREMENTS

General Course Work Requirements

The minimum number of units of course work depends on the degree (see acceptance for MS or PhD Degrees). The list of courses selected will vary to some extent with the background and interests of the applicant. Often students take more than the minimum number of units required. Course work is divided into core requirements that must be
taken by all students and electives that accommodate special interests within the broad field of comparative pathology. It is the intent of the graduate group that the course work be selected to provide each student with an area of specialization in a field of principal interest and some competence in one or more related topics. Examples of fields of specialization are virology and infectious disease, immunology, pulmonary biology, environmental disease, neurobiology, cancer biology, toxicology, cell biology and molecular pathobiology.

At the beginning of the program, each student should meet with his/her major professor and graduate adviser to develop a plan of course work to achieve the student’s objectives and satisfy the degree requirements. The course plan may cover at least two years because of the alternate-year offering of some graduate courses. The plan of study will be reviewed and approved by the Master Adviser. Any subsequent changes must be discussed with, and approved by the Master Adviser.

Acceptance for MS or PhD Degree

The emphasis of the program is the PhD degree. Most applicants with a professional medical degree or an MS degree are accepted directly into the PhD program. Applicants with a baccalaureate degree may be accepted for either the MS or PhD degree, depending upon their previous academic performance. Students in the MS program may change the degree objective to PhD if they have outstanding progress and endorsement from their major professor.

All graduate advisers of the group are appointed in accordance with Graduate Council policies and Graduate Studies procedures to serve as deputies in matters affecting individual graduate students and their academic programs. This adviser provides assistance in planning the overall program of study to ensure that all requirements are met. The master advisor maintains records of each student’s performance. Forms and petitions used by graduate students must be signed by an adviser.

The major professor is the faculty member who provides detailed supervision of a student’s program and whose laboratory is usually the setting for most of the student’s research activities. The major professor advises on details of course work and other aspects of the academic program that are tailored to suit the individual student’s programmatic needs and career goals. The major professor is the chair of the dissertation committee for a PhD or MS Plan I (thesis) degree and the chair of the examination committee for a MS Plan II (comprehensive examination) degree.

REQUIREMENTS FOR THE MS DEGREE

The minimum residency requirements for the MS degree is three quarters, but the amount of time spent by most students in this program is one to three years. The degree of Master of Science is given under MS Plan I and MS Plan II. The student may fulfill the requirements for the master’s degree under either plan.
MS Plan 1

The student is required to take a minimum of 30 quarter units of upper division and graduate course work and submit a thesis based on original research. The course requirements must be fulfilled by taking the required core courses and such additional elective courses as are needed (See attachment #1). For students for whom none of the course work has been waived, the required course work is 28 or 29 units, of which 18 or 19 units are in graduate courses. (The one unit variation depends upon which immunology course [IMM 293 - 4 units or PMI 270 - 3 units] the students take.) Moreover, students must take at least one research specific seminar either from the list included in attachment #2 or a seminar previously approved by an adviser. When a crn# is unavailable, the student must request special approval from the master adviser. At least 12 of the 30 units must be in graduate courses in the major field as defined by the graduate adviser and the major professor. Most of the additional units are obtained by taking research courses (XXX - 299) from the major professor or other collaborating faculty.

MS Plan 2

The student is required to take a minimum of 36 quarter units of upper division and graduate course work and pass a comprehensive final examination. The course requirements must be fulfilled by taking the required core courses and such additional electives courses as are needed (Please see attachment #1). For students for whom none of the course work has been waived, the required course work is 28 or 29 units, of which 18 or 19 units are in graduate courses. (The one unit variation depends upon which immunology course [IMM 293 - 4 units or PMI 270 - units] the student takes.) Moreover, students must take at least one research specific seminar either from the list included in attachment #2 or a seminar previously approved by an adviser. When a crn# is unavailable, the student must request special approval from the master adviser. At least 18 of the 36 units must be in graduate courses in the major field as defined by the graduate adviser and the major professor. No more than 9 units of research (XXX - 299) may be used to satisfy the 18-unit graduate course requirement. Generally, the comprehensive examination is oral. By mutual consent of the examining committee and the student a portion of the examination may be written. Two to three hours is allowed for the examination.

Choice of MS Plan

Before starting the MS degree program, the student must discuss with the major professor whether Plan I or Plan II best meets the student’s career goals. The decision must then be presented to the Master Advisor for review and approval.

ADVANCEMENT TO CANDIDACY

The student must file an Application for Advancement to Candidacy with Graduate Studies after the completion of at least one-half of the course requirements for the
degree. This should be done at least one academic quarter before completion of all degree requirements.

Students obtaining the MS by Plan I (thesis) must have the candidacy application signed by the thesis chairperson (major professor) and the master adviser. At the time the student submits the form to the master adviser, there should be an accompanying letter from the major professor recommending names of two other faculty members to serve as additional members of the three-person thesis committee.

Students obtaining the MS by Plan II (examination) need to have the Application for Advancement to Candidacy signed only by the Master Adviser. The student submits the form to the master adviser together with a letter from the major professor containing the names of four faculty members who would be suitable members of the Committee for the comprehensive examination. The master adviser selects two of those plus the major professor in recommending the membership of the three-person committee.

The normal graduate group policy is for the comprehensive examination to be conducted orally and for the candidate to defend one or two major fields of specialization within comparative pathology in addition to the field of general pathology.

It is the responsibility of the student to contact the chair of the committee and, in consultation with the entire committee, to arrange a time for the examination.

Progression from MS to PhD Degree

Although students may be admitted directly into the PhD program, students accepted for the MS degree will not automatically be accepted into the PhD degree program. An MS student wanting to pursue a PhD degree must be scholastically excellent in the MS degree program. Normally the student will be expected to complete the MS degree before proceeding for the PhD degree. However, if the student and the major professor agree that the student’s research is more appropriate for a PhD degree, the student may be admitted to the PhD program without completing the MS degree. The student may be required to complete additional course work for the PhD degree.
REQUIREMENTS FOR THE PHD DEGREE

The minimum residency requirements for the PhD degree is six quarters, but the amount of time spent by most students in this program is four to five years. The degree of Doctor of Philosophy is given under dissertation Plan B. Within the established framework, the group’s requirements are as follows:

Course work

The student is required to take a minimum of 30 quarter units of course work, including XXX - 299 (research) units. In practice, students take more than the minimum number of units. For students for whom none of the course work has been waived, the required course work is 34 or 35 units, of which 28 or 29 units are in graduate courses. (Please see attachment #3). (The one unit variation depends upon which immunology course [IMM 293 - 4 units or PMI 270 - 3 units] the student takes.) Moreover, students must take at least one research specific seminar either from the list included in attachment #2 or a seminar previously approved by an adviser. When a crn# is unavailable, the student must request special approval from the master adviser. Additional elective courses are taken as determined by the field of specialization and the need to prepare for the qualifying examination. The major professor and the advisor provide the student with guidance in selecting appropriate elective courses. Students who are accepted into the PhD program after completing the MS degree in Comparative Pathology must take those core courses that they did not take for the MS. MS students who completed all the PhD course requirements are not required to take any other courses other than research (XXX - 299) and elective courses necessary for greater understanding of their field of specialization or to further prepare for the qualifying examination. Students entering the PhD program after finishing an MS degree in another institution may be allowed to waive some required courses if the adviser considers the courses taken at that previous institution are similar to the Comparative Pathology required courses. It is possible, although highly unlikely, that a student who has obtained an MS degree at another institution could have courses that would be sufficiently similar to the Comparative Pathology PhD course work to waive all the required courses. However, graduate students must have a GPA. Therefore, it is required to take at least one graded course and obtain a GPA of 3.0 or greater. Students admitted to the PhD program after having finished an MS degree are required to take 30 additional units. Much of this requirement can be met by taking research (XXX - 299) courses.

Qualifying Examination

The student must pass a qualifying examination before being advanced to candidacy. The student must satisfy the course work requirements before taking this examination. It is recommended that the student take the examination by the end of the second year in the program.

In addition to general pathology, the student must defend two fields of specialization within the broad scope of comparative pathology (see examples of fields of
specialization listed in General Course Work Requirements.) The major professor notifies the Master Adviser of the fields the student will defend and includes a list of ten faculty members who would be suitable members of the qualifying examination committee. The majority of the qualifying examination committee must be members of the Graduate Group in Comparative Pathology. Other scientists may be nominated for the committee. In some cases the major professor may be required to justify nomination. The major professor may not serve on this committee. The master adviser uses these names in recommending the membership of the five-person committee to the Office of Graduate Studies. The qualifying examination committee is appointed in accordance with Graduate Council policies and Graduate Studies procedures.

It is the responsibility of the student to contact the Chair of the committee and, in consultation with the entire committee, arrange a time for the examination.

Generally, the qualifying examination is oral and includes:


By mutual consent of the qualifying committee and the candidate, a portion of the examination may be written.

A dissertation research proposal must be prepared by the student and distributed to the committee at least one week prior to the examination. The proposal is to include background information, hypothesis to be tested, specific aims and a brief discussion of the experimental methods. It should not exceed six typed pages.

The committee that guides in the research and preparation of the dissertation is not formally appointed until the student has successfully completed the qualifying examination and advances to candidacy.

**Advancement to Candidacy**

The Application for Advancement to Candidacy is sent to the candidate after the qualifying examination has been passed. It must be signed by the major professor (chair of the dissertation committee) and the master adviser. When the form is submitted for the adviser’s signature, it should be accompanied by a letter from the major professor recommending two faculty members to serve as the other members of the dissertation committee. Normally the dissertation committee is made up of three faculty members (major professor and two faculty members.) Committees may be composed of more than three members and qualified outside scientists may also serve provided they are justified by the major professor and approved by the Office of Graduate Studies.
Dissertation

The dissertation is on a subject chosen by the candidate and must contain an original contribution to knowledge on that subject. Generally the subject of the dissertation is an extension of the type of research conducted by the major professor. The dissertation committee guides the candidate’s research and approves the dissertation before it is submitted to the Graduate Studies.

The candidate must present an outline of proposed research to the dissertation committee at the beginning of the research program and must keep them informed regularly on progress and any changes in direction. It is recommended that the candidate and major professor occasionally meet with the other members of the dissertation committee in order to discuss progress, changes, etc.

The graduate group leaves to the discretion of the dissertation committee whether the candidate is required to defend the dissertation in a formal oral examination. The group does, however, strongly recommend that at least one manuscript derived from the dissertation be submitted for publication in a peer-reviewed journal before the dissertation is finally approved. In addition, the group requires that the student present a seminar on some part of his/her research prior to the dissertation being signed.

Detailed instructions on the form for the dissertation can be obtained from Graduate Studies.

The graduate group recommends that the dissertation be written in chapter format with a general introduction, complete literature review, one or more chapters consisting of journal-ready manuscripts and overall conclusions. Material from recently published manuscripts can be used in the body of the dissertation. Co-authored material can be used as part of a dissertation, providing the candidate is the senior author and principal source of the material presented.

TEACHING COMPONENT

It is recommended but not required that students obtain teaching experience. Generally, this experience will be arranged by the major professor, the department chair and the faculty of the student’s home department.
MS
REQUIRED COURSES IN COMPARATIVE PATHOLOGY

CELL BIOLOGY

BIS 104 - Regulation of Cell Function (3)
MCB 121 - Molecular Biology of Eukaryotic Cells (3)

PATHOLOGY

PMI 298 - (Lecture Portion of VMD 452) General Pathology (2)
PMI 275 - Comparative Pathology (4)
PMI 285 - Cellular Basis of Disease (3)
MMI 280 - Molecular Pathology of Human and Animal Diseases (3)

STATISTICS

STA 100 - Applied Statistics for Biological Science OR (4)
MPM 402 - Medical Statistics I (4)

IMMUNOLOGY

IMM 293 - Current Concepts in Immunology OR (4)
PMI 270 - Advanced Immunology (3)

ETHICS

PMI 250 - Philosophy and Ethics of Biomedical Science (1)

GROUP SPECIFIC SEMINAR SERIES

PMI 290 - Seminar (First seminar) (1)

RESEARCH SPECIFIC SEMINARS

One required (1)
<table>
<thead>
<tr>
<th>Class</th>
<th>Title</th>
<th>Quarter</th>
<th>Day</th>
<th>Time</th>
<th>Room</th>
<th>Units</th>
<th>CRN Available</th>
</tr>
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<tbody>
<tr>
<td>ANS 291</td>
<td>Current Research in Animal Science (TBA)</td>
<td>F, W, S</td>
<td>Mon</td>
<td>12:00-1:00</td>
<td>2154 Meyer</td>
<td>1</td>
<td>Yes, from class Schedule and Reg Guide but the contact is Jennifer at 2-1250</td>
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<tr>
<td>APC 290</td>
<td>Journal Club (Dr. Pinkerton)</td>
<td>F, W, S</td>
<td>TBA</td>
<td>TBA</td>
<td>CHE (Center of Health and Evn.)</td>
<td>1</td>
<td>Contact Dr. Pinkerton 2-8334 for info &amp; APC for CRN #</td>
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<tr>
<td>APC 291</td>
<td>Center for Comparative Resp. Biol. &amp; Med (Pulmonary Seminar Series)</td>
<td>F, W, S</td>
<td>Fri</td>
<td>8:00-9:00</td>
<td>TBA</td>
<td>1</td>
<td>Yes, from APC</td>
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<tr>
<td>ECL 296</td>
<td>Ecology and Evolution Sem Series (Dr. Schwartz)</td>
<td>F, W, S</td>
<td>Thur</td>
<td>4:00-5:00</td>
<td>TBA</td>
<td>1</td>
<td>Yes, from Class Schedule and Reg Guide</td>
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<tr>
<td>PHR 290A</td>
<td>Topics in Equine Reproduction (Dr. Ball)</td>
<td>F, W, S</td>
<td>TBA</td>
<td>TBA</td>
<td>TBA</td>
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<td>Yes, from PHR</td>
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<tr>
<td>PHR 290B</td>
<td>Current Topics in Avian Medicine (Dr. Wakenell)</td>
<td>F, W, S</td>
<td>Fri</td>
<td>12:00-1:00</td>
<td>TBA</td>
<td>1</td>
<td>Yes, from PHR</td>
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<tr>
<td>PHR 292</td>
<td>Animal Genetics Journal Club (Dr. Bannasch)</td>
<td>F, W, S</td>
<td>Wed</td>
<td>12:00-1:00</td>
<td>TBA</td>
<td>1</td>
<td>Yes, from PHR</td>
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<td>PHR 292</td>
<td>Topics in Reproduction (Dr. Lasley)</td>
<td>F, W, S</td>
<td>Wed</td>
<td>12:00-1:00</td>
<td>TBA</td>
<td>1</td>
<td>Yes, from PHR</td>
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<tr>
<td>PMI 290</td>
<td>CCM Seminar Series (Dr. Baumgarth)</td>
<td>F, W, S</td>
<td>Tue</td>
<td>12:00-1:00</td>
<td>TBA</td>
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<td>Yes, from PMI</td>
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<tr>
<td>PMI 291A</td>
<td>Seminar in Immunology (Dr. Gershwin)</td>
<td>F, W, S</td>
<td>Mon</td>
<td>4:00-5:00</td>
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<tr>
<td>PMI 291B</td>
<td>Histopathology (Dr. Wilson)</td>
<td>F, W, S</td>
<td>Wed</td>
<td>9:00-10:00</td>
<td>TBA</td>
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<tr>
<td>PMI 292A</td>
<td>Seminar in Animal Virology</td>
<td>Spring</td>
<td>Wed</td>
<td>12:00-1:00</td>
<td>2016 Har</td>
<td>1</td>
<td>Yes, from PMI</td>
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<tr>
<td>VME 493</td>
<td>Retroviral Pathogenesis (Dr. Sparger)</td>
<td>F, W, S</td>
<td>Fri</td>
<td>12:00-3:00</td>
<td>Tupper</td>
<td>1</td>
<td>Yes, from VME</td>
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<td>Not a course</td>
<td>CBST (Center for Biophotonics Science and Technology) Seminar Series</td>
<td>F, W, S</td>
<td>Fri</td>
<td>2:00-3:00</td>
<td>TBA</td>
<td>-</td>
<td>No CRN but contact is Yin Yeh <a href="mailto:yyeh@ucdavis.edu">yyeh@ucdavis.edu</a></td>
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</table>

Comparative Pathology degree requirements
Approved on March 28, 2005
| Not a course | Cell and Molecular Physiology Seminars (Alternates every other Fri with Journal Club) | F, W, S | Fri | 2:30-3:30 | TBA | - | No crn – contact Golda at 2-3230 |
| Not a course | Veterinary Path Journal Club | F, W, S | Mon | 8:00-9:00 | TBA | - | No crn but contact the Senior Anatomic Path Resident at 2-4262 |
| Not a course | Cancer Biology Research Seminar | F, W, S | Thur | 9:00-10:00 | UC Davis Cancer Cent-Sac | - | No crn but the contact is Fran at (916) 734-3111 The url is http/cancer.ucmc.ucdavis.edu/about/events/seminar.html |
| Not a course | Ecology/Epidemiology Lab Meeting | F, W, S | Wed | TBA | TBA | - | No crn but the contact is Janet Foley at jefoley@ucdavis.edu |
PhD

REQUIRED COURSES IN COMPARATIVE PATHOLOGY

CELL BIOLOGY

BIS 104 - Regulation of Cell Function (3)
MCB 121 - Molecular Biology of Eukaryotic Cells (3)

PATHOLOGY

PMI 298 - (Lecture Portion of VMD 452) General Pathology (2)
PMI 275 - Comparative Pathology (4)
PMI 285 - Cellular Basis of Disease (3)
MMI 280 - Molecular Pathology of Human and Animal Diseases (3)

STATISTICS

MPM 402 - Medical Statistics I (4)
MPM 403 - Medical Statistics II (4)

IMMUNOLOGY

IMM 293 - Current Concepts in Immunology Or (4)
PMI 270 - Advanced Immunology (3)

ETHICS

PMI 250 - Philosophy and Ethics of Biomedical Science (1)

GROUP SPECIFIC SEMINAR SERIES

PMI 290 - Seminar (First seminar) (1)
PMI 290 - Seminar (Second seminar) (1)

RESEARCH SPECIFIC SEMINARS

Two required (1)