Application for Approval for a Designated Emphasis
in the Biology of Vector-borne Diseases
Revised June 29, 2006

I. Description of the Designated Emphasis

The academic focus of the Designated Emphasis group in Biology of Vector-borne Diseases (DE) is the scientific study of pathogens, the diseases they cause and the arthropod vectors that transmit the pathogens to humans and animals (domestic and wild). The objectives of such study are: 1) to understand the diverse interactions and adaptations between the vectors, pathogens and hosts in their existing and newly invaded environments; 2) to evaluate existing disease control strategies and interventions; and 3) to develop novel strategies to reduce the impact of arthropod vectors on human and animal health. In response to the growing need to curb the spread of these diseases we propose to educate cohorts of specialist graduates under a proposed DE in Biology of Vector-borne Diseases. Employment opportunities in the academic and in operational public health sectors for specialists in biology of vector-borne diseases are expanding significantly. Many vector-borne diseases are both veterinary and public health concerns. DE instruction and research will integrate theoretical, basic, and applied elements from fields such as entomology, epidemiology, genetics, systematics, microbiology and immunology. Currently, integrated instruction in these fields is not available. This DE will differ from existing programs by providing more coordinated, focused, and informative instruction under a central DE that brings together expertise in human and animal health and insect biology. We envision that students trained in this DE will be well poised to design, implement and evaluate methods and interventions to interrupt and control pathogens of human and veterinary importance.

Several vector borne diseases have re-emerged worldwide with devastating consequences to human and animal health. Some of these diseases include: 1) malaria, with over 2.5 million human deaths annually; 2) dengue and dengue hemorrhagic fever, with 2.5 billion people at risk of infection; 3) West Nile virus infection, with over 1000 human deaths in North America, tens of thousands of wild bird deaths annually, a 70% mortality rate in unvaccinated horses, and tens of millions of Americans at risk of infection, and 4) Rift Valley fever, with massive epidemics killing tens of thousands of livestock and several hundred people in Africa and the Middle East each year. UC Davis has recognized the need to provide teaching and research expertise in this area by hiring internationally recognized faculty. These hires include Gregory Lanzaro (Department of Entomology), Aaron Brault (Department of Pathology, Microbiology and Immunology) and Shirley Luckhart (Department of Medical Microbiology and Immunology).

The purpose of the proposed DE is to provide Ph.D. students with opportunities to advance integrative studies of endemic/enzootic and emerging vector-borne diseases through cooperative research and training offered in Ph.D. programs in the College of Agricultural and Environmental Sciences, the School of Medicine and the School of
Veterinary Medicine. This curriculum is endorsed by five graduate groups and is designed to create an environment for faculty and students who would otherwise never or very infrequently interact to learn, meet and exchange knowledge on vector-borne diseases. Furthermore, effective application of modern day molecular/proteomic tools for the management and control of both arthropods and pathogens requires an integrative knowledge for design of control methods, implementation and *post hoc* assessment. Major federal and private funding agencies recognize the need to bridge basic and operational research and have established funding mechanisms and programs for cooperative endeavors between basic and field-related scientists and private industry.

The purpose of the Biology of Vector-borne Diseases DE is also endorsed by the Center for Vector-borne Diseases, and a new initiative to create a Global Health program at UC Davis led by Kathryn DeRiemer (Departments of Public Health Sciences and Medical Microbiology and Immunology).

II. Description of the Academic Nature of the Designated Emphasis

A. Affiliated Programs List

Affiliated Ph.D. programs are in italics

College of Agricultural and Environmental Sciences
   *Department of Entomology*

School of Medicine
   *Graduate Group in Microbiology*

School of Veterinary Medicine
   *Graduate Group in Comparative Pathology*
   *Graduate Group in Immunology*
   *Graduate Group in Epidemiology*

B. Chair's Letters.
Please find enclosed

C. Affiliated Faculty (Letters of support are enclosed.)

College of Agricultural and Environmental Sciences
   *Department of Entomology*
   Anthony Cornel
   Gregory Lanzaro
   Bruce Hammock
   Thomas Scott
   Robert Washino, Chair
School of Medicine
Department of Medical Microbiology and Immunology
  Blaine Beaman
  Satya Dandekar, Chair
  Shirley Luckhart
  Richard Pollard, Chief, Division of Infectious Diseases
  Jerold Theis
  Jose Torres

Department of Public Health Sciences
  Kathryn DeRiemer
  XiaoWei Yang

School of Veterinary Medicine
Department of Pathology Microbiology and Immunology
  Aaron Brault
  Patricia Conrad
  N. James MacLachlan
  William Reisen
  Jeffrey Stott
  Tilahun Yilma, Director, International Laboratory of Molecular Biology for Tropical Disease Agents (ILMB)
  Dennis Wilson, Chair

Department of Population Health and Reproduction
  Bruno Chomel

Department of Medicine and Epidemiology
  Christian Leutenegger

D. Admissions Criteria

1. Admission of students to the Designated Emphasis in the Biology of Vector-borne Diseases (DEBVD) program:

Prior to taking the Ph.D. qualifying examination of his/her degree program, a graduate student in good standing in a relevant affiliated program must declare an interest in the DEBVD program and be admitted by unanimous decision of the Executive Committee. Specific criteria to determine whether students will be admitted to the DE include:
  1) Agreement to take the DEBVD required course and two elective courses/seminars approved by the Executive Committee.
  2) The student will agree to participate in the annual DEBVD student competition by presenting a poster of his/her research results.
Interest in the DEBVD should be declared as soon as possible after graduate admission so that the student can complete the DEBVD requirements in the appropriate time frame of the affiliated graduate program.

2. Impact on normative time to degree in affiliated Ph.D. programs:

The time required to satisfy the requirements of the DEBVD should not substantially affect the time taken to complete the affiliated Ph.D. degree since it is anticipated that most of the courses required for the DEBVD will serve to fulfill concurrently the course requirements of the affiliated graduate program. It is anticipated that the DEBVD course requirements will constitute no more than 3 of the courses required of their affiliated program but will vary depending on the course requirements of the affiliated graduate program.

3. Appointment of the faculty to the Qualifying Examination and Dissertation Committees:

The Executive Committee, in consultation with the Chair of the students’ Ph.D. program, will recommend at least one DEBVD faculty member to the Dean of Graduate Studies for appointment to the students’ Qualifying Examination and Dissertation Committees. The same faculty member may sit on both committees or two different faculty members of the DEBVD may be recommended. It is recommended that, and in the usual case, the major professor would be a member of the affiliated graduate program as well as the DEBVD program.

4. Examination requirements:

The Ph.D. qualifying examination shall include examination of a general understanding of biology of vector-borne diseases and an in depth comprehension of the specialty area of the affiliated graduate program. At least one faculty member of the designated emphasis shall participate in the qualifying examination. Satisfactory performance on the qualifying examination for the Ph.D. will be judged independently from performance on the designated emphasis portion of the examination.

5. Dissertation requirements:

The dissertation topic shall focus on research appropriate to the academic focus of the DE. The dissertation committee shall include at least one faculty member of the DE.

6. Degree conferral process:

The DE will be awarded solely in conjunction with the Ph.D. and will be signified by the degree designation Ph.D. in X with Emphasis in the Biology of Vector-borne Diseases, where X is one of the affiliated graduate programs.
E. Curriculum

1. Required courses.

Curriculum requirements for students admitted to DEBVD program will include the core course, Changing Patterns of Vector-borne Infections (PHR 214/ENT 214), and 2 elective courses/seminars from a list of courses in vector-borne disease biology as approved by the Executive Committee. Courses may not be repeated for credit.

2. Elective courses and seminars

College of Agriculture and Environmental Sciences

Department of Entomology

Undergraduate
ENT 153-(T.W. Scott) Medical Entomology - 4 unit course.
ENT 102 (Staff) Insect Physiology- 4 unit course.

Graduate
ENT 212- (Staff) Molecular Biology of Insects and Insect Viruses- 3 unit course.
ENT 253- (T.W. Scott) Advanced Medical Entomology. 3 unit course- Prerequisite One upper division course in Entomology other than ENT 153 and one course in Microbiology. ENT 153 or equivalent is recommended
ENT 291N – (R. Kimsey and T.W. Scott) Current topics in Medical Veterinary Entomology Seminar- 2 unit seminar- Prerequisite ENT 153.
ENT 292N- (B. D. Hammock and W. L. Leal) Current topics in Insect Physiology & Behavior- 2 unit seminar- Prerequisite ENT 102.
ENT 293N- (B. D. Hammock and W. L. Leal) Current topics in Insect Biotechnology & Genomics Seminar- 2 units – Prerequisite ENT 212.

School of Medicine

Department of Medical Microbiology and Immunology

Undergraduate
MMI 115 (Theis) Ecological Parasitology - 3 units
MMI 116 (Theis) Parasitology for Wildlife Biologists - 3 units

Graduate
MMI 215 (Theis) Medical Parasitology - 5 units
MMI 208 (Luckhart, Dandekar) Emerging Challenges in Microbiology and Immunology – 1 unit seminar, repeatable
MMI 480A (Torres/Lasalle) Medical Immunology - 2.5 units - Prerequisite consent of instructor
MMI 480B (Beaman) Medical Microbiology - 3.5 unit course - Prerequisite consent of instructor
Department of Public Health Sciences
Undergraduate
   EPP 101 Perspectives in Community Health - 3 units

Graduate
   EPP 244 Introduction to Medical Statistics - 4 units
   EPP 245 Statistical Analysis of Laboratory Data - 4 units
   EPP 246 Biostatistics for Clinical Research - 4 units
   EPP 247 Biostatistics for Epidemiology - 4 units
   EPP 273 Topics in Public Health - 1 unit seminar, can repeat three times for credit
   EPP 295 International Health Care - 1 unit seminar

Internal Medicine
Undergraduate
   IDII41 (Dandekar) Infectious Diseases of Humans - 1 unit

Graduate
   IDI 211 (Flynn, Chomel, DeRiemer) Epidemiology and Prevention of Infectious Diseases - 3 units - Prerequisites include EPI 205A, 207 or Internal Medicine 421.

School of Veterinary Medicine

Graduate Group in Immunology
   IMM 201 (Miller, Cho, Gershwin, Ashwood) Basic Immunology – 4 units
   IMM 293 (Baumgarth) Current Concepts in Immunology – 4 units – Prerequisite
   IMM 201
   IMM 295 (Staff) Cytokines – 2 units – Prerequisite IMM 293 or consent of instructor

Department of Medicine and Epidemiology
   EPI 204 (Tsodikov) Statistical Models, Methods and Data Analysis for Scientists - 4 unit course - Prerequisites STA 130B or STA 131B or STA 133 and STA 108 recommended
   EPI 205A (Hird) Principles of Epidemiology - 4 unit course - Prerequisite MPM 402 or consent of instructor.
   EPI 205 B (Hertz-Piciotto) Integration of basic Epidemiologic Concepts - 2 unit course - Prerequisite MPM 405 or EPI 205A.
   EPI 206 (Hird) Epidemiologic Study Design - 3 unit course - Prerequisites EPI 205 A and EPI 205B

Department of Pathology, Microbiology and Immunology
Undergraduate
   PMI 128 (Miller) Biology of Animal Viruses - 3 unit course - Prerequisite BIS 102

Graduate
   PMI 291A (Gershwin) Seminar in Immunology -1 unit - Prerequisite PMI 126
   PMI 293A (Byrne) Seminar in Infectious Diseases - 1 unit

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PMI 418 (Ziccardi) Health and Disease in Terrestrial Wildlife - 2 units - Prerequisite First, second, or third year standing in the School of Veterinary Medicine or consent of instructor
PMI 419 (Ziccardi) Field Techniques for Assessment of Wildlife and Ecosystem Health - 2 units - Prerequisite consent of instructor

Department of Population Health and Reproduction
Graduate
MPM 402 (Farver) Medical Statistics I - 4 units
MPM 403 (Farver) Medical Statistics II - 4 units - Prerequisite MPM 402 or the equivalent
MPM 404 (Farver) Medical Statistics III - 4 units - Prerequisite MPM 403 or the equivalent with consent of adviser
PHR 212 (Chomel) Epidemiology of the Zoonoses - 4 units - Graduate standing or third year standing in the School of Veterinary Medicine or consent of instructor
PHR 266 (Kass) Applied Analytic Epidemiology - 3 units - Prerequisite MPM 404 or consent of the instructor.

Courses not listed here can be submitted for approval to the Executive Committee to fulfill elective credits. The required curriculum, and any subsequent changes to the required curriculum, must be approved by the Executive Committee.

F. Student Advising

Each student’s academic progress will be reviewed annually by the Executive Committee. This evaluation will include a short interview/discussion with each student in the presence of all the members of the Executive Committee. The interview will focus on discussions of student progress in completing the necessary core and elective courses/seminars and on progress in completing proposed thesis research. Discussion on the research project will not focus on content but rather on progress in meeting timelines of experimentation, data accumulation, analysis and thesis writing. Student knowledge and progress in scientific content of projects will be reviewed by the qualifying examination committee.

III. By Laws

The DE shall be governed by bylaws that will be used to direct the administration of the DE, and define the requirements for both student and faculty participation in the program. The bylaws were prepared as outlined in the Bylaws Guidelines for Graduate Programs –Departmentally-based Graduate Programs, Graduate Groups and Designated Emphasis Programs http://169.237.212.130/gradcouncil/bylaws.htm

IV. Resources
In order to initiate the DE on Biology of Vector-borne Diseases no additional resources are required since participating faculty are currently responsible for curricular requirements: 1) the core course ENT/PHR 214, 2) courses and seminars on vector-borne diseases and related areas. Stipends of current students are covered by participating faculty home departments and by federal and other research grants of faculty. Further funding will be requested from the NIH (training grant) which requires that this DE first be approved and in place before proposal submission. Facilities and other resources for students are provided by departments and the Center for Vector-borne Diseases.

V. Evaluation of DE

The DE will be reviewed by the graduate Council five years after the first cohort of students is admitted into the program. Thereafter, the program will be reviewed by Graduate Council on the periodic 7-year cycle. The “sunset clause” will be reset at the end of each successful review by Graduate Council.