1. Relationship to the current program curricula

The department of entomology is starting a new curriculum emphasis in the area of public health as it relates to entomological issues. This curriculum is being developed jointly with the UMDNJ School of Public Health. "Case studies in Vector borne diseases" is envisioned as a recruiting course offered at the undergraduate level for majors. Concomitantly, the course will also accommodate graduate level students by further providing exploratory and mentoring opportunities (MS and PhD entomology, DEENR students from Rutgers, and MPH students from the School of Public Health, UMDNJ).

2. Relationship to other courses

Introductory Biology is the only requirement for this course. The course will be taught in the same semester as "Medical and Veterinary Entomology" a graduate course, and there are many parallels and collaborative opportunities for students taking both courses. Further, there will be several parallels with "Insect Biology" and "Insect Ecology" (Department of Entomology) and "Introduction to Ecology and Evolution", "Parasite Ecology", "Ecosystems Ecology and Global Change", and "Principles of Evolution" (DEENR), as well as multiple courses in the Department of Human Ecology and Public Health (UMDNJ).

3. Course Description

Case studies in Vector borne diseases
Dr. Dina M. Fonseca, dinafons@rci.rutgers.edu

Course Learning Goals

Instructor's Goals:
This course aims to expose future citizens, researchers, as well as Public Health officials to basic ecological and evolutionary principles underlying the current upsurge of infectious diseases, especially those transmitted by insect vectors (such as malaria, dengue, Lyme disease, and West Nile virus). A common sense argument is that such knowledge, if obtained using teaching strategies that emphasize and demonstrate its usefulness will lead to more informed and effective Public Health in the US. Both fortunately and unfortunately considering the millions that have suffered, this field is rife with "teachable moments and events". Although it may turn out to be relatively straightforward to interest the students in the course, a major challenge I foresee, having taught several lectures in related courses, will be to go beyond the unavoidable mock disbelief, condescending smile, and/or feelings of despondency.

My aim is to provide students with the knowledge tools (know how to break a problem into small steps, know to expect interactions between variables, know some basic un-intuitive principles of ecology and evolution) to start addressing a public health problem.

Student Goals:
A successful student in this course will not be surprised in the future by the complexity of biological systems and how they can impact human health in unexpected ways. Further, this

student will be able to ask useful, testable questions when confronted with a Public health concern.

There are clear and measurable objectives for students participating in this course. After this course, students will be able to 1) relate vector biology, ecology, and evolution to disease transmission, pathology, virulence, and control; 2) evaluate complex, real world situations to determine the impact scientific thinking and processes have on social, political, and international development issues; 3) evaluate the quality of scientific data and hypotheses by analyzing the controversies surrounding emerging diseases; 4) research and present information during and after collaborative work.

Assessment:
The students' course progression will be assessed by examining their oral and written ability to respond to problems – both fictitious and taken from real life examples. Knowledge of the background content – obtained by literature searches, discussions with me and with fellow students as well as researchers and public health officials (during invited talks) – will be measured in so far as it relates to the specific problem being tackled. As a result, final knowledge content will likely vary between students and will reflect their specific interests and career goals, as well as their initial level – undergraduate, graduate, major, non-major. However, core ecological and evolutionary principles, as well as several molecular biology methodologies, will be covered since they will undoubtedly permeate any discussion and be critical to address a public health problem.

Examples we will tackle will range from situations close to home "what to do about the persistent mosquito biting nuisance in my yard", or nebulous such as "how should the United States prepare for the possible recrudescence of yellow fever?". These approaches will predominantly involve discussions of past and on-going case studies informed by readings and critical analysis of the primary literature (peer reviewed) as well as of historical accounts.

Case Studies in Vector-borne Diseases

Course Number 11:370:401:01 and 16:370:501:01
FALL SEMESTER
Dr. Dina M. Fonseca, dinafons@rci.rutgers.edu or fonseca@aesop.rutgers.edu

Week Number	Topic
1)	a) Course overview and requirements b) SENCER-SALG (pre-course assessment) c) What is a vector?
2)	a) 5 minute quiz b) Hawaii in 2001 - Introduction
3)	a) Hawaii in 2001 – student presentations b) Group evaluations and discussion

4)	a) Yellow fever – Historical introduction b) Introduction to the parasite c) Disease domestication (evolution)
5)	a) Yellow fever – Student presentations b) Group evaluations and discussion
6)	First exam
7)	a) Malaria - Introduction b) Disease ecology - introduction
8)	a) Molecular methods in Vector Borne Diseases b) Population genetics c) Vaccines d) Transgenics
9)	a) 5 minute quiz b) Group discussion (journal club)
10)	a) Malaria – Student presentations b) Group evaluations and discussion
11)	a) West Nile virus – Introduction b) Introduced species (vector and parasites) c) SLE and EEE - modeling
12)	Second exam
13)	a) Lyme disease - Introduction b) Reservoir hosts c) Ecology of complex life-cycles and multiple hosts
14)	a) 5 minute quiz b) Group discussion (journal club) c) SENCER-SALG (post-course assessment)

Grading – Tests and in class participation – especially presentations and contribution to journal clubs - are each 50% of the grade.

TEXT- there is no required text. Materials from a variety of sources will be provided each week, including an outline of the notes for the class. Examples of the texts follow, with the first 2 being the primary sources.

a) Lemon SM, Sparling PF, Hamburg MA, and David A., M.D. Relman. 2008 Vector-Borne Diseases: Understanding the Environmental, Human Health, and Ecological Connections, Institute of Medicine, National Institutes of Health
b) Stearns SC and Koella C. 2008. Evolution in Health and Disease. 374 p. Oxford Biology (second edition)
c) Ostfeld RS, Keesing F, and Eviner VT (editors). 2008. Infectious Disease Ecology: Effects of Ecosystems on Disease and of Disease on Ecosystems (Paperback). 506 p. Princeton University Press, Princeton, NJ.
d) Marquardt WC et al. 2004. The Biology of Disease Vectors. 785 p. Elsevier Academic Press
e) Keeling MJ and Rohani P. 2008. Modeling Infectious Diseases in Humans and Animals 367 p. Princeton University Press, Princeton, NJ.
f) Eldridge, BF and JD Edman. 2000. Medical Entomology. 659 p. Kluwer Academic Publishers, Dordrecht, The Netherlands.
g) Mullen G and Durden L 2002. Medical and Veterinary Entomology 597 p. Academic Press

In addition, numerous articles are provided from the American Society of Tropical Medicine and Hygiene, Journal of Medical Entomology, Ecology, Evolution among others. The students are instructed to create their own reference text using the notes and printed handouts provided to support each lesson.