

COURSE NAME; NUMBER; SEMESTER; MEETING DAYS, TIMES, AND PLA.

Medical and Veterinary Entomology

11:370:406; Fall 2019

Thursdays (5:35 pm)

Thompson Hall Cook campus. Room TBD

CONTACT INFORMATION:

Instructor(s): Álvaro Toledo

Office Location: Thompson Hall. Office 130

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Office Hours: Open

COURSE WEBSITE, RESOURCES AND MATERIALS:

- 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.

COURSE DESCRIPTION:

Medical and Veterinary Entomology is a scientific discipline that studies the impact of arthropods and arthropods borne diseases in public and animal health. The epidemiology of vector-borne pathogens have dramatically changed in recent years, as we have witnessed the introduction of Zika and West Nile viruses in the US, Crimean-Congo hemorrhagic fever in south-western Europe, and the continuous emergence of Lyme disease throughout the Northeast of the USA and central Europe. As a result, there is an increasing public health interest in arthropods and vector-borne pathogens.

The objective of this course is to understand the impact of arthropods and vector-borne diseases on public and animal health by learning principles in vector biology and infectious diseases, as well as the ecological and evolutionary processes that determine the epidemiological patterns of arthropods and vector-borne diseases. In this course, you should expect to do much more than to memorize; students must be able to analyze, discuss and assess scientific data and hypotheses surrounding the controversies of emerging diseases and present this information in a logical and scientific manner.

The course Prerequisites are 01:119:115/116 General Biology I and II. (Recommended)

LEARNING GOALS:

- Master the essential biological aspects (anatomy, physiology, ecology, and biochemistry) of medical arthropods
- Awareness of the impact that insects and mites have on humanity, especially in public health.
- Understand vector management and different control strategies.
- Preparation to be professionals in public health entomology: a) Ability to design, implement and analyze experiments and interpret results in entomological research. b) Communication of entomological information to the scientific community and the public.

ASSIGNMENTS/RESPONSIBILITIES, GRADING & ASSESSMENT:

Assignments are expected before due date. Fail to comply with the due date will result in a zero on the assignment. Assignments can be directly turn in, printed, in class or in my office (Thompson Hall, room 130). If you are unable to turn in a printed copy before the due date you can send it by email to alvaro.toledo@rutgers.edu. Nonetheless, you are still required to provide a printed copy of your assignment. All assignments must have a title and your name.

Grading

Attendance and participation (30%)

Attendance is mandatory (30% of your final grade relays on participation [presentations 15%]). Thus, you should be on time and ready for discussion (I expect lively class discussions). Thus, assignments such as readings are mandatory and are expected to be done in preparation for class discussions.

The students' course progression will be assessed by short quizzes (15%) at the beginning of each class and by examining their oral and written ability to respond to the topics introduced in the classroom. Therefore, participation in discussions in class is highly encourage.

Midterm exams (35%)

The midterm exam will roughly count 1/3 of the final grade and will cover the topics and assignments described in the first 15 lectures. The midterm exam will consist of a multiple option text (70%) and short questions (30%).

Final exam (35%)

The final exam is comprised of multiple-choice test (80%) and two short question (20%).

Assessment

Assessment of individual learning goals will be performed through classroom assessment techniques at the beginning of each class. In addition, there will be a midterm exam that will summarize the learning goals acquired in the first part of the course. To evaluate acquisition of learning goal that are complex or interrelated (for example biology of mites, chemical control and strategy design for pest control in agriculture) students will present in class case studies.

a) Creating and implementing Classroom Assessment Techniques (CATs).

1. **Discussion:** 10 min discussion on the main topics taught in the previous class. Student's responses will be analyze and group them into categories "good understanding", "some understanding" significant misunderstanding" I will reinforce the concepts that according to the results are confusing for students and will create specific activities to ensure that students improved their understanding on the subject.
2. **Rapid fire:** A set of short questions on topics already introduced in class and related to the new material that will be presented.

b) Creating Assignments.

1. **Student's presentation.** Students will have to present a class related topic. Students are encourage to apply and connect different concepts presented in previous classes. Students will have rubric with performance criteria such as clarity of presentation, argument, evidence etc...a performance level indicate the level of mastery within each criterion.

c) Midterm exam and Final exam.

Exams will identify what courses objectives will be measured.

1. **Midterm exam.** This exam assesses the ability of the student to connect the biological aspects of vectors with their impact in human and animal health. The student should be capable of explaining the factors that affect the epidemiology of vector-borne diseases.
2. **Final exam.** This exam assesses, in addition to the goals described for the midterm, the ability of the student to connect the biological aspects of vectors to surveillance and control. . The student should be

capable of explaining the epidemiology of different vector-borne diseases and how they relate to the biological cycle of ticks, mosquitoes and fleas. The student should be capable of identifying the most prominent sign and symptoms of the most common vector-borne diseases as well as methods for prevention, control and treatment.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

Enter additional text here if you wish

ABSENCE POLICY

Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

COURSE SCHEDULE:

Week Number Topic

1 - Introduction I (Dr. Toledo)

- a) (pre-course assessment)
- b) Types of problems caused by arthropods
- c) Invasive vectors, invasive pathogens, vector competence vs. vectorial capacity

2 - Introduction II (Dr. Toledo)

- a) Myiasis, screwworms = Sterile male technique
- b) Insecticides, insecticide resistance

3 - Mosquitoes (Dr. Toledo)

- a) Biology, ecology, and control
- b) Flavivirus and alphavirus: Yellow fever, dengue, Zika and Chikungunya
- c) In-class discussion of Likos et al 2017 (Zika in Florida)

4 - Human pests (Dr. Toledo)

- a) Head Lice, body lice and bedbugs biology and control.
- b) The evolution of body (clothes) lice.
- c) Louse-borne disease: epidemic typhus, trench fever.
- d) In-class discussion

5 - Fleas and flea borne diseases (Dr. Toledo)

- a) Biology, ecology and control.
- b) Murine typhus, plague and cat scratch disease

6 - Ticks (Dr. Toledo)

- (a) Hard ticks
- (b) Soft ticks
- c) biology, ecology and control

7 - Tick borne diseases (Dr. Toledo)

(a) Relapsing fever, Lyme disease, Human Granulocytic Anaplasmosis (HGA), Human Monocytic Ehrlichiosis (HME), Rocky Mountain Spotted Fever (RMSF), Babesiosis, Tick-borne encephalitis (TBE), Powassan, and African swine fever

8 - Midterm (October 25, 2018)

Followed by in class discussion

9 - Kinetoplastid pathogens: vectors and diseases (Dr. Toledo)

- a) Assassin bugs (Hemiptera, Reduviidae)
- b) Chagas; Sand flies (Diptera, Phlebotominae): Leishmaniasis
- c) Tsetse flies (Diptera, Glossinidae): sleeping sickness (Human African trypanosomiasis)

10 - Mites (Acari) (Dr. Toledo)

- a) allergies, scabies, dermatites or nothing at all (eyelash mites)
- b) Mite-borne diseases: Rickettsial pox and Orientia tsutsugamushi

11 - Vector-borne disease epidemiology (Dr. Toledo)

- a) Climate change and vector-borne diseases
- b) Vector-borne diseases in the Anthropocene
- c) Zoonosis and One Health

12 - Surveillance and Control (Dr. Toledo)

- a) Mosquitoes
- b) Ticks

13 - Rapid fire overview (Dr. Toledo)

14 –

- a) Invited Speaker: Andrea Egizi, Visiting Professor and Head of the Tick-borne Diseases Lab – Monmouth Co. and Rutgers CVB
- b) Invited Speaker Dina Fonseca. Professor of Entomology and Director of the Center for Vector Biology
- c) Discussion

Final exam - during Finals

FINAL EXAM/PAPER DATE AND TIME

Online Final exam Schedule: <http://finalexams.rutgers.edu/>

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.

- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.