

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

Applied Acarology

11:370:355; Spring 2019

Tuesdays and Thursdays (3:55-5:15 pm)

Thompson Hall Cook campus. Room TBD

CONTACT INFORMATION:

Instructor(s): Álvaro Toledo

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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:

Acarology is a scientific discipline that studies mites and ticks. The goals of this course are to learn the biology, diversity and phylogeny of this taxon as well as the economic impact that mites have in agriculture and human health. Lastly, we will review different approaches to control and minimize their impact. The course will have 3 different parts:

1. Basic structure and Function of Mites: We will discuss topics including morphology, feeding, excretion, water balance, muscle system, respiration, nervous system, circulatory system, life cycle, diapause, dispersal, reproduction, genetic and sex determination.
2. Diversity and lifestyles: Mites and ticks are a diverse group that is very well adapted to different environments. We will review plant-feeding mites, mites that prey on other mites, soil mites and animal and human ectoparasites mites among others
3. Agriculture and public health impact of mites: We will cover mites that are human and agricultural pests or vector diseases as well as species that are beneficial.

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

LEARNING GOALS:

- Master the essential biological aspects (anatomy, physiology, ecology, and biochemistry) of mites.
- Awareness of the impact that mites have on humanity especially in agriculture and public health.
- Understand mite management and their potential use in biological control.
- Preparation to be professionals in agricultural and 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 (20%)

Attendance is mandatory (take advantage of it; 20% of your final grade relies on attendance and participation). 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 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 (45%)

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 on case studies.** Students will have to present in class a resolved case study facilitated by the professor. In order to solve the case study, students will have to apply and connect different concepts presented in class. 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 mites with their agricultural impact and control. The student should be capable of explaining different strategies for pest control (Cultural, biological, etc...) as well as factors that affect the effectivity of each type of control.

2. **Final exam.** This exam assesses the ability of the student to connect the biological aspects of ticks with their impact in public health. The student should be capable of explaining the epidemiology of different tick-borne diseases and how they relate to the biological cycle of the tick. The student should be capable of identifying the most prominent sign and symptoms of the most common tick-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 - Lecture 1. Course introduction.
 - a) Pre-course Assessment
 - b) Course Assignments
 - c) General Introduction to Acarology
 - d) Characteristics of the Taxon Arthropoda
 - e) Classification of Mites
- 2 - Lecture 2. Basis Structure and Function of Mites I.
 - a) Morphology
 - b) Feeding and Food Types
 - c) Excretion
- 3 - Lecture 3. Basis Structure and Function of Mites II.
 - a) Water balance
 - b) Organs and systems.
 - c) Life Cycle and diapause
- 4 - Lecture 4. Basis Structure and Function of Mites III
 - a) Reproduction/Dispersal
 - b) Genetics and Sex determination
- 5 - Lecture 5. IPM I
 - a) History
 - b) Classical, Augmentative and Conservation Biological Control
 - c) Quarantines
 - d) Cultural Controls
 - e) Genetic Control
- 6 - Lecture 6 IPM II
 - a) Chemical Controls
 - a. Acaricide Classifications
 - b. Insecticides as Acaricides
 - c. Acaricides types

7 - Lecture 7 IPM III

- a) Acaricide resistance
- b) Managing resistance
- c) Evaluating resistance
- d) Host-Plan Resistance

8 – Lecture 8. Tetranychidae I: Premier Plant Pests.

- a) Systematics
- b) Biology
- c) Role of Silk
- d) Dispersal
- e) Population Dynamics
- f) Anatomy

9 – Lecture 9. Tetranychidae II: Premier Plant Pest.

- a) Genus that affect plants
- b) Tetranychidae and Plant diseases
- c) Weed control
- d) Pesticide Resistance

10 – Lecture 10. Tarsonemidae: Plant Feeding Pest

- a) Biology
- b) Control
- c) Pest species

11 – Lecture 11. Eriphyoidea: The Q Pest.

- a) Biology
- b) Vectors of disease
- c) Some Pest species
- d) Invasive species
- e) Biological Control of Weeds and Pest
- f) Collecting and Sampling
- g) Identification
- h) Control

12 – Lecture 12. Fake Spider Mites

- a) Biology
- b) Species Around the world
- c) Vector of Plant Diseases
- d) Control

13 – Lecture 13. The Penthalidae

- a) Introduction
- b) Red-legged earth mite
 - a. Biology
 - b. Monitoring
 - c. Control: Biological, chemical and cultural controls
- c) Blue oat mite
 - a. Biology
 - b. Aestival Diapause
 - c. Control: Biological, chemical and cultural controls
 - d. Host-Plant Resistance.

14 – Lecture 14. Other associated plant mites

- a) Anystidae: A wallflower friend.

- b) Hypoaspidae: A good Friend
 - c) Tuckerellidae: The rare pest
 - d) Tydeidae: Multitask family of friends (mostly)
 - e) Acaridae: A foe and an occasional friend.
 - f) Hemisarcoptidae: A non-appreciated friend
 - g) Stigmaeidae: Wine friends
 - h) Oribatida: Soil friends, root foes.
- 15 – Lecture 15. The phytoseiidae: Natural born killers
- a) Biology
 - b) Systematics
 - c) Biological Control Programs.
 - d) Prey-Location Behavior
 - e) Dispersal
 - f) Pesticide Resistance
- 16 – Midterm exam.
- 17 – Lecture 16. Pest Mites of Honey Bees
Varroa jacobsoni)
- a) Biology and Taxonomy
 - b) Monitoring *Varroa*
 - c) Control of *Varroa*
 - d) Integrated *Varroa* Management
- Acarapis woodi*)
- a) Biology
 - b) Control
- 18 – Lecture 17. Ticks I
- a) Ticks as pests
 - b) Biology of the Ixodidae (hard ticks)
 - c) Most important genera
- 19 – Lecture 18. Ticks II
- a) Biology of the Argasidae (Soft ticks)
 - b) Pest management of Ticks
- 20 - -Lecture 19 Pest mites of Pets and Farm Animals I
- a) Roost mite
 - b) European or Northern Fowl mite
 - c) Tropical Fowl mite
 - d) Chiggers
- 21– Lecture 20 Pest mites of Pets and Farm Animals II
- a) Follicle mites
 - b) Hay-itch Mites
 - c) Fur mites
 - d) Acaridid Mites
 - e) Endoparasites of Livestock
- 22 – Lecture 21 Mite-borne diseases. I: Lyme disease
- 23 – Lecture 22 Mite-borne diseases. II:
- a) Human Granulocytic Anaplasmosis
 - b) Human Babesiosis
 - c) Human Granulocytic Ehrlichiosis
- 24 – Lecture 23 Mite-borne diseases III

a) Rickettsiosis transmitted by ticks

b) Rickettsiosis transmitted by mites

25 – Lecture 24 Pest mites of stored products

a) The Acaridae

b) Mites Other than the Acaridae

c) Control of mites

26 – Lectures 25 Pest mites of Households

a) Importance of Dust Mites

b) Species

c) Biology

d) IM and Allergens

27 – Rapid fire

28 – Student presentation

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.