

INSECT BEHAVIOR

(11:370:519)

Number of credit hours: Three (3)

Semester: Fall 2020

Days and times of lectures: W, Th (12:35 - 1:55 pm)

Location: Virtual

Instructor: Dr. Chloe Hawkings

Office location: Thompson Hall, Room 132

Office hours: By virtual appointment

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Course Overview: The study of behavior is the study of how an organism responds to adapt or adjust to internal and external stimuli. It is fundamental in understanding how insects interact with their environment, with other insects, and how their physiology enables them to adjust to new conditions.

Prerequisites: General Biology I and II (01:119:115/116)

Course Description: This course will provide an empirical overview of insect behaviors to characterize how they respond to both external and internal stimuli. Behavior is deliberate, and this course overviews how, what, and why insects behave in certain ways. This course will investigate the inter and intraspecific relationships of insects, and their interaction with their environment. Topics in this course will focus on what the definition of behavior is, how behavior is studied, how insects perceive stimuli, the internal and external sources of stimuli, how insects make choices based on stimuli, insect communication, feeding behaviors, sexual behaviors, insect-insect interactions, and current behavioral research to identify how studies in behavior can help society.

Topics include: Characterizing how insects locate resources, how they avoid predators, insect courtship and mating, and sociality in insects. In addition to viewing lectures, students will participate in discussions related to insect behavior and will be active in the field, observing insects and characterizing their behavior.

Learning outcomes: The overall objective of this course is to ensure that all students are fully aware of the fundamental importance and the potential of behavior to any entomological question. Link to Entomology Undergraduate Program Goals: <https://entomology.rutgers.edu/undergraduate/>

1. Students should be able to define basic concepts that define insect behavior presented in lecture material.
(addresses program goal 1)
2. Students should be able to describe principle external and internal processes associated with behavior *(addresses program goal 1)*
3. Students should be able to understand the relationship of an insect's behavior to its environment and other insects or organisms. *(addresses program goal 2)*
4. Students should be able to examine scientific literature and will be familiar with the behavioral techniques addressed to draw conclusions on the importance of behavioral studies. *(addresses program goal 4)*
5. Students should be able to produce original work to investigate a behavior which can be applied in a field or laboratory setting to address a relevant question within their research interests. Emphasis is on the ability to recognize precise observation techniques and draw conclusions on the significance of behavioral observations *(addresses program goal 3)*

Resources:

Text: No Text is required for this course

Resources: Relevant literature that outline the importance of behavioral approaches and understanding of insect relationships to the environment and other organisms. Materials will be distributed weekly through Canvas.

Course Calendar:

Sept. 2: Course outline, Introduction to the Study of Insect Behavior

Sept. 3: Experimental design in the study of behavior

Sept. 9: Communication: Chemical

Sept. 10: Communication: Visual

Sept. 16: Communication: Sound

Sept. 17: Feeding Behaviors and Nutrient Regulation

Sept. 23: Midterm 1

Sept. 24: Plant-Insect interactions

Sept. 30: Predation and Parasitism
Oct. 1: Insects as prey: Defensive behavior
Oct. 7: Courtship and mate location
Oct. 8: Reproduction and sexual selection
Oct. 14: Parental care
Oct. 15: **Midterm 2**
Oct. 21: Behavior of vector species
Oct. 22: Social behavior: semi-social and gregarious insects
Oct. 28: Eusocial insect behaviors
Oct. 29: Mutualism-interspecies interactions
Nov. 4: Phenotypic Plasticity
Nov. 5: **Midterm 3**
Nov. 11: Genetic factors influencing behavior
Nov. 12: Neurobiology and learning behavior
Nov. 18: Physiological factors influencing behavior
Nov. 19: Environmental factors influencing behavior
Nov. 25: Applied behavioral research
Nov. 26: *Thanksgiving: no class*
Dec. 2: Class discussion: Research methods
Dec. 3: Class discussion: Research methods
Dec. 9: Class discussion: Research methods
Dec. 10: Class end
December 16-23 : Final Exam

What is behavior: How behavior is studied and how insects perceive stimuli

Internal and external sources of stimuli: how insects make choices based on stimuli (perception and learning)

Communication: How insects communicate

Feeding: How insects eat and avoid being eaten, predation, parasitism, herbivory

Sexual behaviors: mating, courtship, and care of young

Insect-insect interactions: Eusociality, gregariousness, population density and its effects

Special topics: Applied research and vector biology. Can studying behavior help society?

Grading and assignment:

Exams: Two midterm exams consisting of both multiple choice and essay style questions which cover material from lectures prior to the exam. One final exam is cumulative and covers all lecture material. The exams will assess the ability of the student to define key processes and terms associated with the lecture material

Assignments: Reading assignments are aimed to encourage students to understand the course content and scientific literature to increase participation. Students are expected to contribute to class discussions. Students should display the ability to both interpret and evaluate methodology used in scientific literature

Experimental Design: Students will propose and design a research method intended to study a behavioral aspect of an insect of their choosing. Students should describe at least one behavior that can enhance their research project or interest and understand how this behavior shed light on a physiological system. Students are expected to apply the knowledge from this course to a real-world application, identifying the potential significance. Experimental design will be presented during class discussion and peer reviewed to aid in the understanding of these techniques. Students will be graded on their participation during the peer review discussion

Total % contributed (course):

Midterm Exams (15% each)	45%
Final Exam	15%
Experimental Design	25%
Participation/Peer reviews	15%

Course Etiquette: Attendance is recommended, and participation is required for participation points, failure to participate in discussion will result in a zero. This course requires participation in class activities, discussions, and through questions. A strict late policy is followed in this class, lateness is regarded as absence. Quizzes and handling of grades and assignments will be conducted at the start of the lecture. If you are going to be late, let the instructor know immediately. If you miss a lecture you are responsible for catching up in time for assignments and exams. Missed exams and tests can only be excused through university approved absences. The instructor should be provided proof of university approval no more than one week after the exam date. All assignments are expected to be submitted before the due date. Failure to submit an assignment before the deadline without a university approved absence will result in a zero on the assignment. No disturbances will be tolerated in class, this includes engaging in disruptive behavior and inappropriate cell phone or laptop use that is not related to the course. We strive to create a positive classroom climate to facilitate all students to be able to learn.

Americans with Disabilities Act (1990): The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please visit the Office of Disability Services or contact their office for further information.

Academic Integrity: The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academicintegrity-policy>. The principles of academic integrity require that a student: properly acknowledge and cite all use of the ideas, results, or words of others. You must acknowledge **all** contributors to a given piece of work. All work submitted for a course or other academic activity must be produced by the student turning in the assignment or task and is produced without the aid of impermissible materials or impermissible collaboration. All data or results must be obtained by ethical means and reported 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. You are expected to 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 reputation of the University for integrity in its teaching, research, and scholarship will be 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.