INSECT BEHAVIOR: Mechanisms and Function
ENTOMOLOGY 5420

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Course Format: 2 80-min lectures/week

Reading: There is no assigned text. Reading assignments will be made to supplement the lectures. These readings will be made available on Carmen.

Grading Criteria:
Midterm Exam 33%
Term Paper 33%
Final Exam 33%

A. INTRODUCTION
1. Course Introduction
2. Philosophy and Approaches to the Study of Behavior

B. RESPONSE TO SIGNALS
1. Behavior as Communication
2. Communication Systems
3. Mate-finding:
   a. Chemical Modality
   b. Visual & Auditory Modalities
4. Host-plant Finding/Selection:
   a. Visual Modality
   b. Chemical Modality
5. Mechanisms of Prey Finding
7. Non-source-directed movement
   a. Dispersal vs. Migration
   b. Navigation

C. BEHAVIORAL PHYSIOLOGY
1. Hormonal and Neuromodulatory Control of Behavior
2. Endogenous Rhythms
3. Orientation Mechanisms
   a. Case study: moth orientation to pheromones
4. Neural Organization of Behavior- Challenges & Solutions
   a. CNS & Sensory Inputs
      i. Ormia ears
   b. CNS & Motor Outputs
      i. Moth ears- encoding directionality & motor output
      ii. Cockroach escape
c. Polarized light encoding  
  d. Integration  
  e. Chemical encoding, color vision & Retinex Theory  
5. Molecular approaches to study insect behavior  
6. Biomimetics & insect models for robotics

D. LEARNING & COGNITION  
  1. Behavioral Plasticity and Forms of Learning  
  2. Cognition (including cognitive maps)

E. BEHAVIORAL ECOLOGY  
  1. Origins of Social Systems  
     a. Altruism  
     b. Social Conflict  
  2. Self-Organizing Activities of Societies  
  3. Sexual Selection and the Evolution of Mating Signals

F. APPLIED INSECT BEHAVIOR  
  1. Applications to agriculture, forestry, and human health