

Course Syllabus: Insects and Wildlife

ENY 5212
3 credit hours

Instructor: John L. Capinera
Office: Entomology-Nematology Room 1018
Phone: 352-273-3905
Email: capinera@ufl.edu

Part 1: Introduction to the arthropods

Section 1. Insects and their relatives

- Naming of taxa
- Arthropoda
- Arachnida
- Crustacea
- Diplopoda
- Chilopoda
- Entognatha
- Insecta
- Classification of insects
- Characteristics of the major groups of insects
- Evolution of insects
- Insect biogeography

Section 2. Structure and function of insects

- Integument
- Molting
- Body regions
- The head
- The thorax
- The abdomen
- Internal anatomy
- Muscular system
- Fat body
- Digestive system
- Circulatory system
- Ventilatory system
- Nervous system
- Vision
- Glandular systems
- Polyphenism or polymorphism
- Communication
- Sociality
- Ants

- Social bees and wasps
- Termites
- Metamorphosis
- Reproductive system
- Eggs of insects
- Excretory system
- Thermal biology
- Feeding ecology
 - Scavenging
 - Feeding belowground
 - Feeding in aquatic habitats
 - Feeding on living plants
 - Feeding on blood
 - Predation and parasitism

Part 2: Food relationships

Section 3. Food resources for wildlife

- Assessment of insectivory
 - Methods for determining the abundance of insects
 - Methods for determining wildlife diets
- Nutritional value of insects

Section 4. Wildlife diets

- Analysis of amphibian and reptile diets
- Analysis of mammal diets
- Analysis of bird diets
- Analysis of fish diets
- The benefits of insects for wildlife survival and reproduction
- How insects avoid becoming food for wildlife
 - Crypsis
 - Aposematism
 - Mimicry
 - Startle behavior and attack
 - Physical and chemical defenses
 - Group actions
 - Nocturnal activity

Section 5. Insects important as food for wildlife

- Aquatic insects important as food for wildlife
 - Mayflies (order Ephemeroptera)
 - Stoneflies (order Plecoptera)
 - Dragonflies and damselflies (order Odonata)
 - Bugs (order Hemiptera)
 - Alderflies, dobsonflies, and fishflies (order Megaloptera)
 - Beetles (order Coleoptera)

- Flies (order Diptera)
- Caddisflies (order Trichoptera)
- Terrestrial insects important as food for wildlife
 - Termites (order Isoptera)
 - Cockroaches (order Blattodea)
 - Grasshoppers, katydids, and crickets (order Orthoptera)
 - Earwigs (order Dermaptera)
 - Bark lice or psocids (order Psocoptera)
 - Bugs (order Hemiptera)
 - Lacewings, antlions and mantidflies (order Neuroptera)
 - Beetles (order Coleoptera)
 - Moths and butterflies (order Lepidoptera)
 - Flies (order Diptera)
 - Wasps, ants, bees, and sawflies (order Hymenoptera)

Section 6. Insects and ecosystems

- Insects and decomposition
 - Decomposition of plant remains
 - Decomposition of excrement (dung)
 - Decomposition of carrion
- Nutrient cycling
- Herbivory by insects
 - The importance of herbivory
 - Plant compensation
 - Insect outbreaks
- Plant diseases and insects
- Pollination and seed dispersal by insects
- Invasiveness of insects
 - Pathways of invasion
 - Ecological and taxonomic patterns of invaders
 - Establishment and spread
 - Latency among invaders
 - Why invasive species become so abundant
 - Impacts of invaders

Part 3: Arthropods as disease vectors and pests

Section 7. Transmission of disease agents to wildlife by arthropods

- Arthropod feeding behavior
- Disease in wildlife
- Virulence
- Disease hosts
- Disease transmission
- The causes of disease
- The nature of parasitism
- Parasite-induced changes in host behavior

Section 8. Infectious disease agents transmitted to wildlife by arthropods

Viruses

- Myxomatosis
- Avian pox
- West Nile virus
- Yellow fever
- St. Louis encephalitis
- Hemorrhagic disease

Bacteria

- Tularemia
- Anaplasmosis
- Lyme disease
- Plague
- Avian botulism

Fungi

- Aflatoxin poisoning

Section 9. Parasitic disease agents transmitted to wildlife by arthropods

Protozoa

- American trypanosomiasis
- African trypanosomiasis
- Avian malaria
- Toxoplasmosis

Helminths

- Spirocerosis
- Dirofilariasis
- Elaeophorosis
- Lancet fluke
- Dog tapeworm
- Giant thorny-headed worm

Section 10. Arthropods as parasites of wildlife

Mites and ticks (Arachnida: Acari or Acarina: several orders) affecting wildlife

Mites

- Mange mites
- Respiratory mites
- Ear mites
- Bird mites
- Sarcoptic mange mite

Ticks

- Taiga tick
- Wood tick

Insects (Insecta) affecting wildlife

- Lice (Insecta: Phthiraptera)

Bugs (Insecta: Hemiptera: Reduviidae, Cimicidae, and Polyctenidae)

Assassin bugs, subfamily Triatominae – kissing bugs (Hemiptera: Reduviidae)

Bed bugs, swallow bugs, and bat bugs (Insecta: Cimicidae and Polyctenidae)

Flies (Insecta: Diptera: several families)

Mosquitoes (Insecta: Diptera: Culicidae)

Black flies (Insecta: Diptera: Simuliidae)

Biting midges (Insecta: Diptera: Ceratopogonidae)

Phlebotomine sand flies (Insecta: Diptera: Psychodidae: Phlebotominae)

Horse flies and deer flies (Insecta: Diptera: Tabanidae)

Tsetse flies (Insecta: Diptera: Glossinidae)

Muscid flies (Insecta: Diptera: Muscidae)

Stable fly

Blow flies (Insecta: Diptera: Calliphoridae)

New World screwworm fly

Flesh flies (Insecta: Diptera: Sarcophagidae)

Bot and warble flies (Insecta: Diptera: Oestridae)

Louse flies (Insecta: Diptera: Hippoboscidae)

Fleas (Insecta: Siphonaptera)

Other taxa of occasional importance to wildlife

Eye gnats (Insecta: Diptera: Chloropidae)

Snipe flies (Insecta: Diptera: Rhagionidae)

Bees and wasps (Insecta: Hymenoptera: various families)

Ants (Insecta: Hymenoptera: Formicidae)

Dermestids (Insecta: Coleoptera: Dermestidae)

Part 4: Pest management and its effects on wildlife

Section 11. Pesticides and their effects on wildlife

Insecticide mode of action

Persistence of insecticides

Acute effects of insecticides

Sublethal effects of insecticides

Other pesticides

Indirect effects of pesticides on wildlife

Insecticides in the food chain

Risks of insecticides

Resistance to insecticides

Summary

References and additional reading

Section 12. Alternatives to insecticides

Environmental management or cultural control

- Physical and mechanical control
- Host resistance
- Semiochemicals
- Biological control
- Area-wide insect management
- Integrated pest management (IPM)
- Preventing versus correcting problems

Part 5: Conservation issues

Section 13. Insect-wildlife relationships

- How wildlife affect insect survival

 - Naturally occurring predation by wildlife on insects

 - Western pine beetles and woodpeckers

 - Spruce budworm, birds and mammals

 - Gypsy moth, birds, mammals and beneficial insects

 - Rangeland grasshoppers and birds

 - Crop-feeding aphids and birds

 - Crop-feeding caterpillars, spiders and birds

 - Tropical forest floor-dwelling insects and lizards

 - Tropical forest insects, bats and birds

 - Aquatic insects, ducks and fish

 - Animal ectoparasites and birds

 - Introduction of vertebrates for biological suppression of insects

- How insects affect wildlife survival

 - Predation by insects on wildlife

 - Effects on terrestrial wildlife

 - Effects on aquatic wildlife

 - Symbiotic relationships between insects and wildlife

 - The benefits of insects for habitat conservation

- The benefits of insects for wildlife-based recreation

Section 14. Insect and wildlife conservation

- Other economic benefits of insects

 - Pollination

 - Honey

 - Silk production (sericulture)

 - Shellac

 - Dyes

 - Food for humans and domestic animals

 - Medical treatment

- Conservation of insects, the smallest 'wildlife'

 - Conservation status

 - Advancing the conservation of insects

 - Conservation of bumble bees

 - Conservation of butterflies

Conservation of beetles
Managing insect resources for the benefit of wildlife
Principles
Practices

Course Description

Insects and other arthropods and their relationships with wild vertebrate animals.

Prerequisite or Co-requisite

ENY 5006L or the equivalent entomology laboratory.

Course Goals and Objectives

Students will develop an understanding of the ecological relationships of arthropods and pesticides with natural resources, particularly the roles of arthropods as food, nuisance pests, vectors of animal disease, and in natural resource and wildlife conservation. They will learn methods of arthropod diet assessment and evaluate how different methodologies affect the outcomes of research. They will learn how arthropod populations can be manipulated to favor wildlife, and will create a wildlife management plan that applies the principals and practices provided in the course and in the supplemental readings.

Course format

This course is offered in traditional lecture mode and as narrated WWW or CD-ROM. Notes in Powerpoint format are available to in both color and black and white should you care to print them.

There are 3 graded exams for this course.

Also, there are three 'quizzes'. The first is built into Chapter 1 and is self-grading. The grade is not reported; it is for your use only as a study aid. If you can answer these questions successfully you are acquiring adequate knowledge about the relationship of insects and their relatives.

There also are two supplemental units (quizzes) on identification associated with Chapters 1 and 5. The former 'quiz' provides study aids for identification of insect orders and insect relatives. The latter 'quiz' stresses identification of arthropods of particular importance to wildlife. These 'quizzes' are not graded, but I suggest that you study the explanations as to how these insects are identified.

Graduate students also must conduct an independent research project.

Grading for Course

Students are responsible for the content of the lectures and textbook. They also must submit a research project. The course grade is based on performance on the 3 exams and the project. The exams and project are weighted equally (25% each). The final grade will be assigned as:

A=>93
A-=90-92.9
B+=87-89.9
B=83-86.9
B-=80-82.9
C+=77-79.9
C=73-76.9
C-=70-72.9
D+=67-69.9
D=63-66.9
D-=60-62.9
E=<60

Grade point equivalencies for grades are found at:
<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>

Note that this course is available to both undergraduate and graduate students. Graduate students are responsible for additional readings listed on the graduate syllabus, must answer additional questions on the exams based on those readings, and must submit an independent research project.

Textbook

Capinera, J.L. 2010. Insects and wildlife. Arthropods and their relationships with wild vertebrate animals. Wiley-Blackwell, Oxford, UK.

You are responsible for the material in the text as well as the lecture material.

Research Project

The independent research project is to develop a wildlife management plan that favors the survival and/or reproduction of one species of vertebrate wildlife via manipulation of arthropods. For example, the plan can be based on habitat manipulation that enhances the insect-based food supply, reduces the mortality of wildlife due to pesticides, or reduces the impacts of blood feeding arthropods or the disease causing agents they transmit. Prior approval of the research topic from the instructor is required. This project should be limited to about 5 typewritten pages.

Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities

In 1995 the UF student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the university, the following pledge is either required or implied: **“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”**

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court.

(Source: 2009-2010 Undergraduate Catalog)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. Both the Counseling Center and Student Mental Health Services provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health Services is located on the second floor of the Student Health Care Center in the Infirmary.

- *University Counseling Center*, 301 Peabody Hall, 392-1575, www.counsel.ufl.edu
- *Career Resource Center*, CR-100 JWRU, 392-1601 ext: 0, www.crc.ufl.edu/
- *Student Mental Health Services*, Rm. 245 Student Health Care Center, 392-1171, www.shcc.ufl.edu/smhs/

Alcohol and Substance Abuse Program (ASAP)
Attention Deficit Hyperactivity Disorder (ADHD)
Center for Sexual Assault / Abuse Recovery & Education (CARE)
Eating Disorders Program
Employee Assistance Program
Suicide Prevention Program

Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 392-8565, www.dso.ufl.edu/drc/