

Biology 3327.03 ENTOMOLOGY
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Class syllabus

Insects are the most biodiverse group of organisms on the Earth. They far surpass other terrestrial animals in abundance of individuals and numbers of species, and they occur practically everywhere. Several hundred thousand different kinds of insects have been described - three times as many as there are in the rest of the animal kingdom. The total number of different species of insects may approach 30 million.

Insects have lived on the Earth for at least 350 million years and during this time have evolved in many directions to become adapted to life in almost every type of terrestrial and freshwater habitat.

Insects are extremely valuable to humans, and society could not exist in its present form without them. Many species of crop plants are pollinated by insects, some other species are pests, because they consume crops or stored food, are associated with the transmission of diseases, or interfere with some other human purpose.

In this class students will learn about the role of insects in nature. Specific topics will include the systematics and evolution of insects, their relationships with plants and animals, their value in economics, and their anatomy, physiology, development, life cycles, ecology, distribution, behaviour, classification, nomenclature, and identification. The class includes three field trips for the collecting of insects, following sorting, identifying, labeling and preliminary analysis of data on taxons and trophic group's distribution in several habitats of NS.

1) Lecture 3 hours

Theme: Place of Insects in Nature and Taxonomical Position.

Theme: Evolution of Insects. Relationships with Plants and Animals. Value of Insects in Economics.

Lab 4 hours

Instructions on the microscopes construction and use

Greenhouse, Dalhousie campus

Work with collection of insects: Orders, Families, and Species

2) Lecture 3 hours

Theme: Classification, Nomenclature, Identification.

Theme: Phylum Arthropoda

Trilobita

Chelicerata: Classes Merostomata, Arachnida

Crustacea: Classes Branchiopoda, Copepoda, Ostracoda, Cirripedia, Malacostraca

Atelocerata: Classes Diplopoda, Chilopoda, Pauropoda, Symphyla.

Class Hexapoda. Classification, Phylogeny.

The Entognathous Hexapods; Protura, Collembola, Diplura.

The Aptorygote Insects: Microcoryphia, Thysanura.

Theme: Order Ephemeroptera: Mayflies

Order Odonata: Dragonflies and Damselflies

Lab 4 hours

3) Field trip to York Redoubt, Frogs' pond (9:00 – 16:00)

Lab – 1 hour

4) Lecture 3 hours

Order Grylloblattaria: Rock Crawlers.

Order Phasmida: Walkingsticks and Leaf Insects

Theme: Order Orthoptera: Grasshoppers, Crickets, Katydid

Order Mantodea: Mantids

Theme: Order Blattaria: Cockroaches

Order Isoptera: Termites

Order Dermaptera: Earwigs

Lab – 4 hours

Diversity of insects

5) Field trip to Conrad beach, Lawrence Town Beach (9:00 – 16:00)

Lab – 1 hour

6) Lecture 3 hours

Order Embiidina: Web-Spinners

Order Plecoptera: Stoneflies

Order Zoraptera: Zorapterans

Order Psocoptera: Psocids

Order Phthiraptera: Lice

Lab – 4 hours

7) Lecture 3 hours

Theme: Development and Life Cycles

Theme: Ecology, Distribution, Behaviour.

Theme: Anatomy and Physiology of Insects. Morphology.

Theme: Anatomy and Physiology of Insects. Anatomy and Physiology

Theme: Order Hemiptera: Bugs

Order Homoptera: Cicads, Hoppers, Psyllids, Whiteflies, Aphids and Scale Insects.

Order Thysanoptera: Trips

Lab 4 hours

Identifying of Apterogota, Holometabola (Pterygota)

Quiz 1

Sorting of field samples

8) Field trip to McNab's island (9:00- 16:30)

9) Lecture - 3 hours

Theme: Order Neuroptera: Alderflies, Dobsonflies, Fishflies, Snakeflies, Lacewings, Antions, Owlflies

Theme: Order Coleoptera: Beetles

Lab - 4 hours

Identifying of Hemimetabola insects

Lab 4 hours

Sorting of field samples

10) Lecture - 3 hours

Theme: Order Strepsiptera: Twisted-Wing Parasites

Order Mecoptera: Scorpionflies, Hangingflies

Order Siphonaptera: Fleas

Lab - 4 hours

Identifying of arthropods, Entognatha, Apterigota and Hemimetabola orders

Identifying of Holometabola orders

Lab 4 hours

Sorting of field samples

11) Field trip to Stanley airport and Upper Sackville - – full day (8:00 – 16:00)

Lab 1 hour

12) Lecture – 3 hours

Theme: Order Diptera

Order Tricoptera: Caddisflies

Theme: Order Lepidoptera: Butterflies, Moths.

Theme: Order Hymenoptera: Sawflies, Parasitic Wasps, Ants, Wasps, Bees

Lab - 4 hours

Quiz 2

Sorting, identifying, labeling of the field samples.

Revising material for the lab exam

13) Lab exam

Insect buffet

Laboratory exercises and field trips include collecting insects in natural habitats, sorting and identifying of collected specimens. There are four field trips to the forest, beach, wildlife shelter, for collecting insects.

Organization:

The SEASIDE class is scheduled for ten three hour **lectures**, ten four-hour **labs**, and four **field trips**.

Lectures: Monday to Saturday from 9:05 to 11:55 in LSC-COMMON AREA C334

Labs: Monday to Saturday from 13:05 to 16:55 in LSC-BIOL&EARTH B5012

Grading:

Two quizzes (25% each, 50% total) and final lab exam (30%) will cover subjects from lectures, labs, and text reading. The final lab exam will be a comprehensive exam including all taxa from the beginning to the end of the course. The exam and quizzes include a wide variety of questions and problems, based on insects' morphology, anatomy, physiology, development, ecology, behavior, taxonomy and importance for humans.

Do not miss the exam. Any make-up exam (by prior arrangement or in dire emergency) will consist of a two hour oral examination covering the same general areas of the written exam.

The remainder of the grade is based on the laboratory work and collection of insects with proper identification and labeling of specimens (20%). Guidelines on the collection will be given in lab.

Grading scheme:

Passing Percentage: 50.00	
Minimum Percentage	Letter Grade
90.00	A+
85.00	A
80.00	A-
77.00	B+
73.00	B

70.00	B-
65.00	C+
60.00	C
55.00	C-
50.00	D
.00	F

TEXTBOOKS (not mandatory)

1. Borror, D.J., C. A. Triplehorn, N. F. Johnson, 1997. Introduction to the Study of Insects. 6-th edition. 800 p. Hbj College & School Div; ISBN: 0030253977.
2. McGavin, G.C., 2001. Essential Entomology. 318 p. Oxford University Press, ISBN: 0198500025.

ADDITIONAL BOOKS:

2. Chapman, R.F., 1999. The Insects : Structure and Function. 800 p. Cambridge Univ Pr (Pap Txt); ISBN: 0521578906
3. Bland, R.G., H.E. Jaques, 1978. How to Know the Insects. 432 p. WCB/McGraw-Hill; ISBN: 0697047520
4. Borror, D.J., R. E. White, 1998. A Field Guide to Insects : America North of Mexico (Peterson Field Guides). Houghton Mifflin Co(Pap);ISBN: 0395911702
5. Arnett, R.H., R. Jacques,1981. Simon and Schuster's Guide to Insects. Simon & Schuster (Paper); ISBN: 0671250140 ;
6. O'Toole, C. (Editor), 1995. The Encyclopedia of Insects. 160 p. Checkmark Books; ISBN: 0816013586 ;
7. Pedigo, L. P., 1998. Entomology and Pest Management. 3 edition. 688 p. Prentice Hall; ISBN: 013780024X ;
8. Imes, R., 1992. The Practical Entomologist.160 p. Fireside; ISBN: 0671746952 ;