Entomology 760 - Insect Structure
Fall Semester - 2020

Instructor and other information:

Instructor: David A. Rider, Professor, Hultz 268
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Scheduled Meeting Times and Places: Lecture: M, W, F 9:00-9:50, Hultz 205
Laboratory: Th 2:00-4:30, Hultz 205

Course objectives:

To acquaint students with the comparative external and internal anatomy of insects; to familiarize them with terminology in the field of insect morphology; to provide them with an understanding of the functional relationships of the structures, organs and systems, and evolutionary theory; and to foster development of precise dissection techniques.

During this class we will discuss both external and internal morphology, starting with the external and moving inside the insect later. The student should remember that the terms anatomy and morphology are not synonymous as is often thought. Anatomy deals with structural fact and changes only with evolution. Morphology encompasses anatomy, but also concerns a study of function, or how the structures function to affect the organism as a whole. Thus, ideas on morphology change from author to author, often with disagreement as to the correct interpretation of observed phenomena. Some also believe that the term morphology by definition implies a comparison of homologous structures between different organisms.

This class will be taught as a comparative morphology class. During the discussion of each different topic the anatomical terms will be given for the generalized or "typical" insect. This will then be followed by a discussion of specialized structures for other insects. It is stressed that the student should not limit themselves to the insects discussed in class, but should be interested in comparing the different structures in a wide variety of insects (see also the project for this course).

Texts: **Required:** Chapman, R. F. 1998. The Insects: Structure and Function. Fourth Edition. Cambridge University Press.
Pseudo-Required: Snodgrass, R. E. 1935. Principles of Insect Morphology, Cornell University Press. [We will have departmental copies of this available]

Other References:

Boudreaux, H. B. 1979. Arthropod Phylogeny with Special Reference to the Insects. John Wiley & Sons, New York. 320 pp. (Out of print, but I have a copy)

DuPorte, E. M. 1959. Manual of Insect Morphology. Reinhold Publ. Co., N. Y. 224 pp.

Gordh, G. & D. H. Headrick. 2001. A Dictionary of Entomology. CABI Publishing, Wallingford & N.Y., 1032 pp.

Nichols, S. W. & R. T. Schuh. 1989. The Torre-Bueno Glossary of Entomology, New York Entomological Society, N.Y., 840 pp.

Smith, D. W. 1968. Insect Cells, their Structure and Function. Oliver & Boyd, Edinburgh. 372 pp.

Snodgrass, R. E. 1965. A Textbook of Arthropod Anatomy. Hafner Publ. Co., N. Y. 363 pp.

* Additional references plus pertinent journal articles may be given and in some cases assigned for reading during the course.

TENTATIVE SCHEDULE

Week:	Lecture	Laboratory
1 - Aug. 24	Introduction; Definitions; Evolution; Other Arthropods	Introduction, Other Arthropods
2 - Aug. 31	Primary & Secondary Segmentation; Integument	Segmentation
3 - Sept. 7	Generalized Insect Head	Generalized Insect Head
4 - Sept. 14	Insect Mouthparts; Antennae	Insect Mouthparts
5 - Sept. 21	Thorax: Cervix, Prothorax, & Pterothorax; LECTURE EXAM I (through mouthparts)	Pterothorax
6 - Sept. 28	Insect Wings: Venation, Types, Coupling	Insect Wings
7 - Oct. 5	Flight Mechanism; Thoracic Legs*	Thoracic Legs
8 - Oct. 12	Abdomen & Abdominal Appendages	LAB EXAM I (through legs)
9 - Oct. 19	External Genitalia*	Insect Abdomen
10 - Oct. 26	Insect Gametes; Embryology	Insect Genitalia
11 - Nov. 2	Digestive System, Excretory System LECTURE EXAM II (through Genitalia)	Digestive System
12 - Nov. 9	Respiratory System	Respiratory System
13 - Nov. 16	Circulatory System	Circulatory System
14 - Nov. 23	Nothing (Thanksgiving Week)	VACATION
15 - Nov. 30	Reproductive Systems*; Nervous System* LECTURE EXAM III (through Circulatory System)	Reproductive Systems
16 - Dec. 7	Endocrine System; Sense Organs	Nervous System
Finals Week	LECTURE EXAM IV/LAB EXAM II	

* Subjects marked with an asterick do not have recordings or the recording is not functioning. We will either make new recordings for these subjects, or we will present new lectures.

Assessment:

4 Lecture Exams @ 100 pts. each	400 pts.	900-1000	A
2 Lab Exams @ 100 pts.	200	800-899	B
Laboratory Drawings	200	700-799	C
Project	200	600-699	D
Total	1000	0-599	F

There will be 4 lecture exams and 2 laboratory exams during the semester, each worth 100 points. The last lecture exam and the last lab exam will be a combined exam taken during Finals week; it will consist of a written portion which you will complete and turn in; then you will take the laboratory portion. The laboratory exams will be in the form of lab practicals in which you will be expected to identify various anatomical structures. All lecture and laboratory exams may be comprehensive, but the more recent material will be stressed.

Introduction to Laboratory:

Most weeks, the laboratory is scheduled to meet for 2.5 hours (Thursday, 2:00-4:30), but due to the independent-study structure of the course, this may not be strictly adhered to. Jerry and/or I will be available at this time most weeks; we are also willing to help answer questions at other times during the week. This may not be enough time to complete the laboratory each week, but the classroom can be available at nearly any time, and arrangements can be made to check specimens out. It is necessary that students read any laboratory handouts before starting on the lab projects. This should make the lab exercise go much smoother.

The laboratory grade will be based primarily upon the completion of a set of drawings or exercises designed to acquaint the student with the necessary anatomical structures for that exercise. Remember to keep a broad perspective when looking at the structures; not all insects look the same. The lab drawings or exercises will be due on Friday of the following week. They may be placed in my mailbox in Hultz 202 or brought to my office (Hultz 268) no later than 5:00 PM on the day they are due.

The project will be discussed in class, but basically, each student will select an insect species (with the approval of the instructor); the student will be required to prepare a morphological atlas of that insect species, making drawings of all typical external views of the head, thorax, abdomen, and associated structures, and drawings of all of the major internal systems. The projects will be due on the last day of class at 5:00PM.

Suggested Dissecting and Drawing Materials:

* At least one pair and preferably two pairs of fine-tipped forceps. It would be best to order your own (we can help you place an order), but you can also use those in the department (quality will not be as good as departmental pairs will be worn from use).

* Although not required, a good pair of fine dissecting scissors would also be handy.

* Set of drawing pens (Rapidograph type), with different diameters for drawing lines of different widths - for use with permanent ink.

* Permanent ink.

* Use only #3 hard pencils.

* Use only a high-quality eraser - art gum or similar.

* Use either "Botany Drawing paper" or single ply Bristol Board with good plate finish, 8.5 x 11.

* Straight edge with a recessed edge.

Remember that dissection does not mean cutting animals into pieces; it involves separating parts so as to leave them intact and clearly visible. Except for cutting through the body wall, very little scissor work will be necessary.

Instructions on Making the Drawings:

* Make line drawings (not diagrams). Shading or hatching will not be required except when needed to demonstrate relationships that would otherwise be unclear.

* If you are making a lateral view the specimen's head should be to the left of the page.

* If you are making a dorsal or ventral view the specimen's head should be at the top of the page.

* If you are drawing a leg or wing the base of the structure should be to the left of the page.

* Sutures should be drawn with a single line while ridges should be drawn with a double line.

* Make drawings as large as possible on 8.5 x 11 inch paper, but leave room for titling and labeling.

* All structures underlined in the lab handout should be labeled on the drawings.

* Keep labels parallel or straight; all should read in the same direction. The pointers from the label to the structure should be a straight dotted or dashed line. Do not cross a solid line. The labels should be printed or can be typed. Do not misspell words.

* The title should be placed at the top of the drawing and should include:

1) The lab number and title.
2) The aspect drawn (eg. lateral, external, etc.).
3) The name of the organism drawn.

* Your name should go at the bottom right hand corner of the page.

Your drawings will be a record of accomplishment and are designed to improve habits of observation. Patience, care, and interest will overcome the disadvantages of working with animals the size of insects. Skills developed will benefit students in all fields of entomology.

Well-being Resources on Campus and in the Community

As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below:

For students on campus and remotely (telehealth):
Counseling Services: 701-231-7671
Disability Services: 701-231-8463
Student Health Service: 701-231-7331
In a crisis or emergency situation:
Call University Police: 701-231-8998
Call 911
Go to a Hospital Emergency Room
Go to Prairie St. Johns for a Needs Assessment: 701-476-721 (510 4th St. S.)
Call the FirstLink Help Line: 1-800-273- TALK (8255) or 2-1-1
Call Rape and Abuse Crisis Center: 701-293-7273

CAFSNR Syllabus Attachment – Fall 2020

Academic Honesty: *All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System (http://www.ag.ndsu.edu/academics/honor-system-1). The Honor System is a system that is governed by the students and operates on the premise that most students are honest and work best when their honesty, and the honesty of others, is not in question. It functions to prevent cheating as well as penalize those who are dishonest. It is the responsibility of the students to report any violations of the honor pledge to the instructor, honor commission or the Dean of the College of Agriculture, Food Systems, and Natural Resources.*
The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.
Students with special requirements: *Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in the Lower Level of the NDSU Library (231-8463). http://www.ndsu.edu/disabilityservices/.*
Veterans and military personnel*: Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible.*

Important Dates

September 7 Labor Day holiday (no classes/offices closed)
September 2 Last day to add classes via Campus Connection
September 2 Last day for no-record drop of classes @ 100% refund
September 2 Last day to withdraw to 0 credits @ 100% refund
September 8 Financial Aid applied to Student Accounts
September 14 Last day to submit request to audit, pass/fail
September 18 Undergraduate fall graduation application due
September 18 Graduate student fall Graduate Degree applications due
October 16 Grades of Incomplete convert to F
November 2 Spring registration begins
November 11 Veteran's Day (no classes/offices closed)

November 13 Last day to withdraw to 0 credits
November 13 Last day to drop classes with record (W)
November 25-27 Thanksgiving (offices open on Friday)
November 30 Fall commencement participation deadline
December 7-11 Dead Week
December 14-18 Final Examinations
December 18 Commencement