

Entomology 306 – Insect Physiology

Dr. Spencer T. Behmer
509 Minnie Bell Heep Building
Email: s-behmer@tamu.edu
Office Ph: 845-3411; Departmental Ph: 845-2516

Course Description: Physiology of insects; structure and function of internal organ systems and their role in insect success.

Number of credit hours: Three (3) (2 for the lecture, 1 for the lab)
Days and times of lectures: MW 10:20-11:10
Room: 102 Heep Building
Office hours: By appointment

Prerequisites: ENTO 201 (or equivalent). What else? You should have a fundamental knowledge of general biology and of the structure and chemistry of organic molecules that are the fundamental structural units of macromolecules; this information is available in BIOL 113, 114 (Introductory Biology), BIOL 123, 124 (Introductory Lab) and CHEM 227 (Organic Chemistry I). You should also be able to demonstrate, at the introductory level, an understanding of the basic structures of cells (e.g., proteins, lipids, carbohydrates and nucleic acids) and how these molecules and macromolecules interact and function in cellular/physiological systems.

Resources: An i>clicker is required. I recommend that you buy the book, but please note there is an electronic copy available via the library. There will also be various supplemental materials available throughout the semester.

Course text: Klowden, M.J. (2013) *Physiological Systems in Insects, 3rd edition*, Academic Press (available through the library, including online).

i>clicker remote: I will be using i>clicker remotes for the first time this semester. The aim is to make the class more interactive and increase participation.

Handouts: These will include copies of the lecture slides and accompanying vocabulary lists, and will be available as PDFs on the ENTO 306 website (<http://insects.tamu.edu/students/undergrad/ento306/>). Barring extreme circumstances, handouts will be available for download shortly after the lecture.

Supplemental material: Additional readings will be available electronically (usually on the class website) or placed on the reserve shelf at the Medical School Library (MSL).

Course Format: Information will be presented in lectures supplemented with computer presentations, animated movies, in class demonstrations, and handouts of vocabulary. Readings will enforce lecture materials and provide supplemental information. ***Students are EXPECTED to read the material, associated with each lecture, prior to class.*** Students will be called on during class and asked to discuss aspects of the assigned reading.

Course Rationale: The aim of this course is to introduce students to insect structure and function, with a particular emphasis on physiological processes and mechanisms. Insects are confronted with many of the same challenges as other animals, including humans, but they are designed differently and sometimes rely on different processes to solve these various challenges (whether associated with feeding, breathing, maintaining water balance and thermoregulation, growing and developing, or interacting with other organisms and the environment). ***A key objective is to help you view the insects you see in your daily life in a different way.*** Upon completing my class I hope you will ask at least 2 questions. One, why is that insect behaving that way? And two, how does it do that?

Course Goals and Learning Outcomes: By the end of this course, students should have developed a basic understanding of how insect physiological processes work, and be able to identify and describe the key organs, molecules and pathways that are involved. I will assess this understanding using quizzes and exams. Participation in classroom and laboratory discussion is also expected, and students will be called on in class and occasionally asked to work together in groups. In the laboratory, students will become comfortable working with live insects and performing dissections and simple experiments that demonstrate fundamental physiological processes. The ability to understand physiological processes, and the scientific method, will be assessed via quizzes and write-ups of laboratory experiments. Finally, students will gain experience reading scientific literature and develop the ability to analyze and summarize the work and ideas presented in this literature via short written assignments. Students will share their written work, and discuss it orally, with their fellow students and the instructor.

Course Calendar

Week 1	Aug 26	Introduction to Insect Physiology (ENTO 306)
	Aug 28	Metabolic Systems (part 1); Chapter 6 <i>Lab:</i> Introduction, Digital Storytelling Project (DSP) overview, and literature search
Week 2	Sept 2	Metabolic Systems (part 2); Chapter 6
	Sept 4	Metabolic Systems (part 3); Chapter 6 <i>Lab:</i> Insect structure I (provide names of DSP group members, plus topic)
Week 3	Sept 9	Circulatory Systems (part 1); Chapter 7
	Sept 11	Quiz #1 (20 points); Circulatory Systems (part 2); Chapter 7 <i>Lab:</i> Insect structure II (quiz)
Week 4	Sept 16	Excretory Systems; Chapter 8
	Sept 18	Respiratory Systems; Chapter 9 <i>Lab:</i> Insect digestion (quiz)
Week 5	Sept 23	EXAM #1 (50 pts)
	Sept 25	<i>Discuss first exam;</i> Locomotor Systems (part 1); Chapter 10 <i>Lab:</i> DSP bibliography and video treatment plan

Week 6	Sept 30	Locomotor Systems (part 1); Chapter 10
	Oct 2	Signaling Systems (part 1); Chapter 1 <i>Lab:</i> Hormone regulation of trehalose synthesis by the fat body (quiz) Due: DSP initial bibliography (2 annotated primaries, 1 annotated secondary)
Week 7	Oct 7	Signaling Systems (part 2); Chapter 1
	Oct 9	Quiz #2 (20 points); Integumentary Systems (part 1); Chapter 2 <i>Lab:</i> Hypertrehalosomic hormone (HTH) and the beating heart (quiz)
Week 8	Oct 14	Integumentary Systems (part 2); Chapter 2
	Oct 16	Reproductive Systems (part 1); Chapter 3 <i>Lab:</i> Insect respiration (quiz)
Week 9	Oct 21	Reproductive Systems (part 2); Chapter 4
	Oct 23	EXAM #2 (50 pts) <i>Lab:</i> Insect cuticular transpiration (quiz)
Week 10	Oct 28	<i>Discuss second exam</i> ; Behavioral Systems (part 1); Chapter 5
	Oct 30	Behavioral Systems (part 2); Chapter 5 <i>Lab:</i> DSP storyboard, video-editing, file management
Week 11	Nov 4	Nervous Systems (part 1); Chapter 11
	Nov 6	Nervous Systems (part 2); Chapter 11 <i>Lab:</i> DSP storyboard is due (peer review in class; and returned at the end of class)
Week 12	Nov 11	Quiz #3 (20 points); <u>but no lecture</u> (Behmer at EntSoc meeting)
	Nov 13	<u>No lecture</u> (Behmer at EntSoc Meeting) <i>Lab:</i> Work on digital storytelling project
Week 13	Nov 18	Communication Systems (part 1); Chapter 12 (<i>lecture evaluations</i>)
	Nov 20	Communication Systems (part 2); Chapter 12 <i>Lab:</i> Upload videos, plus associated documents on Monday View videos in class
Week 14	Nov 25	EXAM #3 (50 points)
	Nov 27	<u>Thanksgiving break, NO CLASS</u> <i>Lab:</i> none (<i>cancelled because of Thanksgiving</i>)
Week 15	Dec 2	Redefined day, students attend their Friday classes
	Dec 4	Reading day, no class <i>Lab:</i> none (reading day)

N.b.: Substitution of topics and changes in the schedule may occur at the discretion of the instructor based on extenuating circumstances or changes in the relative importance of subject matter coverage.

Grading

The final grade will be based on the total points obtained from...

Three (3) lecture quizzes (20 points each, 60 points total)

Three (3) lecture examinations (50 points each, 150 points total)

Total lecture points – **210 (60% of the total)**

Lab drawing assignments (15 points total)

Six (6) laboratory quizzes (3 points each, best 5 out of 6; 15 points total)

Five (5) laboratory reports (10 points each, 50 points total)

Digital Storytelling Project (60 points)

Total laboratory points – **140 (40% of the total)**

The grading scale is as follows...

A = 315 – 350

B = 280 – 314

C = 245 – 279

D = 210 – 244

F < 210

Nature/procedures regarding quizzes, exams, and written assignments...

1) **Lecture quizzes:** Lecture quizzes will be a mixture of short (1-2 sentences) and long answers (5 pts). Quizzes will be given during the first 15 minutes of class.

2) **Lecture Exams:** Lecture exams will be a combination of short answer (5 pts each) and short essay (15 pts each) questions. Each exam will have a bonus question worth 3 points.

3) **Laboratory quizzes:** Laboratory quizzes will cover material from that day's laboratory. For these quizzes you will be able to use the lab handout.

4) **Laboratory reports:** Laboratory reports are meant to be short scientific papers (2-3 pages). They will include a **heading** (name, date, etc.), **title**, a brief **introduction** (including the aim of this experiment), **methods** (what you did), **results** (including figures, tables), **discussion** (what the results mean), and a **conclusion** (1-3 sentences).

5) **Digital Storytelling Project:** You are required to complete an independent group project using "digital storytelling," the use of computer-based tools to tell a story. This project is designed to increase your skills in communicating principals in insect physiology. You will integrate images, narrative and music and your goal is use your knowledge (gained via lectures, assigned readings and independent research) to become teachers. Much of the knowledge gained in today's world comes via multi-media so this assignment forces you to think deeply on how to be scientifically accurate, accessible, and engaging. Humans are hard-

wired to tell and receive stories so, if done well, your project has the potential to make a lasting impression.

There are many different ways of creating a digital story. Stories tend to tell their narrative using video, photos or cartoons. “[The Story of Stuff](#)” by Annie Leonard is [regarded by many to be one of the most effective](#). Your project will be shorter (3-5 minutes), AND SIMPLER, and use photos to illustrate.

The idea for this assignment came from Colin Orians (a colleague at Tufts University); The full details, as outlined for his Environmental Biology course, is available [online here](#).

Rules of conduct for and during exams and quizzes:

- There will be no excused trips to the bathroom or other excursions from the classroom during an exam.
- If one must leave the room during an exam, that student’s exam must be terminated and submitted to the instructor. Exceptions will be made on a case-by-case determination at the instructor’s discretion.
- Students arriving after the start of a test will be allowed to take the test at the discretion of the instructor.
- Tests for all students will end at the time allotted for the exam, regardless if the student started late.
- Examinations missed during an absence will be made up at the discretion of the instructor and only if the absence meets the guidelines of an official absence. *Make-up examinations are discouraged.*
- All materials (books, papers, backpacks) are to be placed below the desk and remain on the floor until the test has been terminated for all students.
- Test papers are to be flat on the desktop at all times – not held up and read.
- Talking or looking at others while taking the test will be considered cheating and grounds for invoking academic dishonesty.
- No food or drinks will be permitted during an examination.

Attendance and class conduct and etiquette:

Lecture attendance: attendance for lectures is not mandatory, but I expect students to attend the lectures. Texas A&M University expects all students to attend class and to complete all assignments. For official rules on attendance, please visit the student rules website (see <http://student-rules.tamu.edu/rule7.htm>). If you miss class on a regular basis, you will be asked to come visit with the instructor to explain your absences.

Laboratory attendance: attendance for the laboratory is mandatory, unless there is an official excuse (see above).

- Unexcused absence from the laboratory will result in loss of 10 points. Leaving the laboratory prior to the end of your experiment will result in a 5-point deduction. These points are deducted from the overall total (350) points possible for the semester, for each case.
- Missed laboratory experiments cannot be made up, even if excused; however the student is still responsible for any information and preparation of a laboratory report with their partner.
- Laboratory quizzes will not be made up.
- Students more than 5 minutes late for the start of a quiz will not be allowed to take the quiz.

- Students will be held accountable for laboratory information regarding experiments, their theory and procedures, regardless of whether the experiment is performed.

Exams and quizzes: you will be required to take all quizzes and exams the days they are scheduled. Only the following absences are considered excused by Texas A&M University...

- Participation in an activity appearing on the university authorized activity list (see <http://studentactivities.tamu.edu/stuactweb/submainpages/authsponmain.htm>).
- Death or major illness in a student's immediate family. Immediate family may include: mother, father, sister, brother, grandparents, spouse, child, spouse's child, spouse's parents, spouse's grandparents, stepmother, step-father, step-sister, step-brother, step-grandparents, grandchild, step-grandchild, legal guardian, and others as deemed appropriate by faculty member or student's academic dean.
- Illness of a dependent family member.
- Participation in legal proceedings or administrative procedures that require a student's presence.
- Religious holy day (see <http://student-rules.tamu.edu/append4.htm>).
- Illness that is too severe or contagious for the student to attend class (to be determined by Health Center or off-campus physician).
- Required participation in military duties.
- Mandatory admission interviews for professional or graduate school, which cannot be rescheduled.

Classroom conduct and etiquette:

- Students are expected to be in their seats and prepared for lecture at the time scheduled for the start of class. Personal conversations should cease at this time.
- If a student must be late, please enter quietly and be seated as close to the door as possible.
- If you have reason to be late consistently, please discuss the reasons with the instructor and obtain approval.
- If a student is absent, the student remains responsible for all lecture or laboratory subjects discussed and materials provided during the period(s) of absence.
- No tobacco products are allowed (this is a University rule for the building).
- No cell phones or pagers in use or active.
- Do not wear contact lenses in the laboratory. Solvent vapors can dissolve in the fluid beneath the lens and damage the cornea.

Laboratory Safety:

The Department of Entomology is committed to the safety of all students and employees participating in teaching laboratories. To ensure that a safe environment is maintained in our teaching laboratories, it is expected that all students will adhere to general safety guidelines and emergency procedures, as well as course-specific and activity-specific safety instructions provided by faculty and teaching assistants. Laboratory safety and emergency procedures will be reviewed during the first class period and you will be asked to sign your acknowledgement of these instructions before attending further classes in this course.

Academic Integrity and Dishonesty

"An Aggie does not lie, cheat, or steal or tolerate those who do."

The processes, procedures, rules and definitions associated with academic misconduct may be found at the websites listed below. All questions associated with academic misconduct should be directed to the Aggie Honor System Office (AHSO) in the Academic Building, Suite 104 or at the following telephone number: (979) 458-3378.

Aggie Honor System Office: <http://www.tamu.edu/aggiehonor>

Rules & Definitions: <http://www.tamu.edu/aggiehonor/acadmiscconduct.htm>

Cheating – Intentionally using or attempting to use unauthorized materials, information, notes, study aids or other devices or materials in any academic exercise.

- During an examination, looking at another student's examination or using external aids (for example, books, notes, calculators, conversation with others, or electronic devices) unless specifically allowed in advance by the instructor.
- Having others conduct research or prepare work without advance authorization from the instructor.
- Acquiring answers for any assigned work or examination from any unauthorized source. This includes, but is not limited to, using the services of commercial term paper companies, purchasing answer sets to homework from tutoring companies, and obtaining information from students who have previously taken the examination.
- Collaborating with other students in the completion of assigned work, unless specifically authorized by the instructor teaching the course. It is safe to assume that all assignments are to be completed individually unless the instructor indicates otherwise; however, students who are unsure should seek clarification from their instructors.

Plagiarism - The appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

- Intentionally, knowingly, or carelessly presenting the work of another as one's own (i.e., without crediting the author or creator).
- Failing to credit sources used in a work product in an attempt to pass off the work as one's own.
- Attempting to receive credit for work performed by another, including papers obtained in whole or in part from individuals or other sources. Students are permitted to use the services of a tutor (paid or unpaid), a professional editor, or the University Writing Center to assist them in completing assigned work. If the student uses such services, the resulting product must be the original work of the student. Purchasing research reports, essays, lab reports, practice sets, or answers to assignments from any person or business are strictly prohibited. Sale of such materials is a violation of both these rules and State law.
- Failing to cite the World Wide Web, databases and other electronic resources if they are utilized in any way as resource material in an academic exercise.

Process and Procedures: <http://www.tamu.edu/aggiehonor/reporting.html>

Appeals: <http://www.tamu.edu/aggiehonor/appeal.html>

Americans with Disabilities Act (ADA) Policy Statement

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 contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637.