

# Organization of Entomology 321

## What's in this course for me?

The evolutionary success of insects is due in part to their physiological makeup and developmental strategies. A basic physiological knowledge about this fascinating group of animals will lead to a better appreciation of the evolutionary processes that have shaped the modern insect.

From a more practical standpoint, what makes an insect tick is important to a wide range of scientists. Those of you interested in applied entomology can gain an appreciation of organophosphate pesticide action on the neuromuscular system. You might consider certain unique physiological or biochemical quirks of insects as possible new approaches to insect control. For those who view insects from an ecological vantage point, you will soon realize that ecological principles are firmly based on physiological constraints. Likewise for the molecular biologist, isolated processes that occur in the cell or test tube may not reflect the response at the organismic level due to the many interacting systems within the individual. Thus, my goal is to survey the field of insect development and physiology not as an isolated discipline, but rather as a cog in the machinery that drives scientific questioning and knowledge. By approaching it from this perspective, you can begin to rationalize why you are taking this course and how it can be of value to you in your own research be it applied or basic.

## Goals of the Course

Entomology is such a diverse discipline that many of you will find some of the areas that we cover only marginally interesting while other areas are of central concern. I realize that problem and have decided to take the following as my goals.

- 1.) Stress central physiological and molecular principles that are necessary for insect life. There are certain principles that all biologists should know, whether you are a taxonomist, an extension agent or a molecular biologist.
- 2.) Provide the vocabulary and intellectual framework to understand the primary literature of insect physiology and development. This course is an entry point into the world of subcellular entomology.
- 3.) Provide an intellectual feast of ideas and facts about insect physiology and development.
- 4.) Provide a “hands-on” opportunity to explore insect morphology and examine structure-function relationships. You can hardly call yourself knowledgeable about insects if you don't know what is inside them. Moreover, there are many ways to overcome ecological problems through anatomical adaptations. Explorations provide a chance to explore those adaptations.

## Outline of subjects to be discussed in ENT 321

Basics of pH, osmosis, cellular energy production, homeostasis, physiological methodology, diversity in physiological systems in different insects

Reproduction

Endocrinology

Development of body plan during embryogenesis

Post-embryonic development

Metamorphosis

Organ systems

Endocrine system

Neural system

Muscular system

Digestive system

Circulatory system

Immune system

Respiratory system

Water homeostasis

Circadian rhythms

Diapause

Flight physics and physiology

## **Grading**

### **1. Phizzquizes (40%)**

Learning for a test is often done at the last minute and information that is so quickly placed in the memory cells is soon forgotten after the exam. So what's the use in that type of exam? I propose a different way of handling the problem.

Every two weeks we will have a Phizzquiz. You will form in teams of 4 and study the material from the preceding two weeks lectures and readings. You will develop THREE questions that you will ask another team of 4 students. Your team is expected to have a hard copy of the questions so that the other team can have it in front of them during. Your team will also type out the expected answers but will keep them separate from the questions. Each group will have about 5 minutes to talk over the questions, pool their knowledge and answer the questions. Questions and answers typed out in a formalized fashion are worth 10% of your overall grade.

There are different types of questions that assess knowledge. At the end of the syllabus, you will find a synopsis of the different types of questions. I want you to develop questions that come from three different types of questions. For example, you may select: 1) factual knowledge question, 2) analysis question, and 3) evaluation question. **Your written questions must state what type of question you are asking.**

The thinking-discussion session for the recipients of the question is 5 minutes. The team being challenged will be expected to satisfactorily answer the questions your team poses. Your group will judge the appropriateness of the answer. Thirty percent of your total grade will come from this section.

If a team fails to answer two questions correctly, then, they must be able to answer all of the questions next round (two weeks later). If they do not, I will give a midterm to that group. There will be one midterm and one final.

You will be in the same group for the first two quizzes. If your team is dysfunctional, you may reform new teams as long as you have 4 participants in the group.

If you succeed in getting by without having to take a midterm or final, then you will receive an A for this section of the course.

I do not give make-up exams and you should have a legitimate excuse for missing the phizzquiz. If you miss two or more phizzquizzes, your group will have to take the midterm and final.

### **Model categories (1-6) and questions and key phrases for developing phizzquiz questions**

#### **1. Knowledge (eliciting factual answers, testing recall and recognition)**

Who	Where	Describe	Which one
What	How	Define	What is the best one
Why	How much	Match	Choose
When	What does it mean	Select	Omit

#### **2. Comprehension (translating, interpreting and extrapolating)**

What does this mean	Classify	Is this the same as
Give an example	Judge	Select the best definition
Condense this paragraph	Infer	What would happen if
State in one word	Indicate	Explain what is happening
What part doesn't fit	Translate	Explain what is meant
What restrictions would you add	Summarize	Read the graph, table
What exceptions are there	Explain	Is it valid that
What seems to be		Show in a graph, table

#### **3. Application (to situations that are new, unfamiliar, or have a new slant)**

Predict what would happen if	Identify the results of
Choose the best statements that apply	Explain how, when why
What do these responses mean	How much change would there be
What would be the results	

#### **4. Analysis (breaking down into parts, forms)**

Distinguish	What is the function of
Identify	State the point of view of
What assumptions	What ideas justify conclusion
What is the relationship between	What is the premise

**5. Synthesis (combining elements into a pattern not clearly there before)**

Make	How would you test
Formulate a theory	Solve the following
Propose an alternative	State a rule
Design	How else would you

**6. Evaluation (according to some set of criteria, and state why)**

Judge	Find the errors
Criticize	Which is more important, better, logical and why
Defend	What fallacies, consistencies, inconsistencies appear
Compare	

**Evaluation sheet for phizzquiz**

Your name \_\_\_\_\_

Your team's names \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Names of the team members you quizzed \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Did all of your team contribute to the development of the questions? Yes \_\_\_ No \_\_\_

Did all of your team contribute to the answers to the question? Yes \_\_\_ No \_\_\_

Were the questions and answers typed and handed in the day before? Yes \_\_\_ No \_\_\_

Did your team have the questions ready for the opposing team? Yes \_\_\_ No \_\_\_

Was each question identified as to where it fit in Bloom's Taxonomy? Yes \_\_\_ No \_\_\_

Did the opposing team answer all the questions to your satisfaction? Yes \_\_\_ No \_\_\_

If no, how many questions did they answer correctly? \_\_\_\_\_

Would you rather several midterms and a cumulative final? Yes\_\_\_\_\_ No\_\_\_\_\_

## 2. Journal article analysis (30%)

Thirty percent of your grade will be based on writing exercises that will examine your creativity and your ability to integrate information from the literature. You will be required to write two, 1000 word essays on papers that you select. These reports will relate to the areas that we are covering in the course (see the syllabus) and will be a layman's description of the paper to another scientist.

One of the best examples of what I want is found in *Science* called "News- In Depth". First, describe how the paper fits into the body of literature. No science is so new that it doesn't spring from some previous observations. Briefly relate the history surrounding why this work was done. Make sure that someone who doesn't know about the subject is adequately briefed. This means that you have to carefully read the introduction and go back to the previous papers to which this manuscript refers to see where the idea originated.

Since you are selecting the article on the basis of its soundness, assume that the work is good and that the authors know what they are talking about. Tell the reader, in general terms, what the article said, emphasizing the important points and how they are new to science. I don't want just a review of what the authors reported, rather I want you to build a readable story that will get others interested in reading the article.

Finally, describe where this research might lead and what future areas of study may evolve from this manuscript. You will have to use your imagination.

The reports will be due October 26 and December 4. Grading will be based on your ability to convince me to read the article and your analysis. Your critique must be at least 1000 typed words but not more. It would be must be double spaced and in 12 point type. **I will not accept late reports so plan on having your critique in on time.**

### Critique sheet for short essays

1. Title: 5 points. Articles such as this require some type of creative title to catch the reader's attention. However, it should remain tasteful while being clever.

Comments: Unacceptable\_\_D\_\_ Average \_\_C\_\_ Good\_\_B\_\_ Excellent\_\_A\_\_

2. Beginning sentence: 15 points. If you don't catch a reader here, there is little chance that the reader will continue.

Comments: Unacceptable\_\_\_\_\_ Average \_\_\_\_\_ Good\_\_\_\_\_ Excellent\_\_\_\_\_

3. Length ~1000 words: 15 points. Editors are very unforgiving individuals, even more than physiology profs.

Comments: Unacceptable\_\_\_\_\_ Average \_\_\_\_\_ Good\_\_\_\_\_ Excellent\_\_\_\_\_

4. Description of science: 25 points. Your description should be positive, enlightening but not

overblown. Nasty comments must be stated in a most genteel manner. Remember, you are trying to get the readers to be supportive of insect research. Provide an interesting historical rationale for this study.

Comments: Unacceptable\_\_\_\_\_ Average \_\_\_\_\_ Good\_\_\_\_\_ Excellent\_\_\_\_\_

5. Organization: 15 points. You should present a flowing narrative with roughly equal weight on each of the ideas. There should be no glaring inconsistency between paragraphs. The reader should have everything laid out in a logical fashion.

Comments: Unacceptable\_\_\_\_\_ Average \_\_\_\_\_ Good\_\_\_\_\_ Excellent\_\_\_\_\_

6. Rationale: 15 points. Why should the taxpayer be interested in supporting such work? Do humans really need to know about this area? In other words, you as the writer must take curiosity driven research (your scientific hobby that no one else in the world really cares about) and make it look like it will cure the ills of the world.

Comments: Unacceptable\_\_\_\_\_ Average \_\_\_\_\_ Good\_\_\_\_\_ Excellent\_\_\_\_\_

7. Goodman's veracity and pleasure scale: 10 points. Did I really believe your argument? Did you add bits of charm and wit to your essay to make it fun and easy for me to read? Did I really want to finish reading your essay?

Comments: Unacceptable\_\_\_\_\_ Average \_\_\_\_\_ Good\_\_\_\_\_ Excellent\_\_\_\_\_

### **3. Reviews of the Lecture and Literature (30%)**

At the beginning of each lecture, one of you will give a five minute overview of the last lecture. This will include some of the high points that you think were interesting or possibly something that you did not understand. You will also be expected to find:

- 1) 4 primary articles that relate to the lecture. These papers should be recent, i.e., in the last 3 years.
- 2) 1 review that may be from the last 5 years.

These articles must be typed in complete reference form. They will be reproduced (by you) and handed out to each member of the class at that time. If you find an article interesting, you might want to make a few comments about the paper. You are required to be somewhat familiar with each of the papers. Read the abstract and look at the techniques. If you don't understand them, maybe we can talk about it during class. We are here to learn, and if learning means talking about material other than lecture, then so be it.

A sign-up sheet gives you some time to think about your schedule. Be aware that I may fall behind in my lecture schedule and if you want to be topic oriented, note that beside your name. If you want to be schedule oriented rather than date oriented, also note that.

### **Grading**

Your final grade will be derived from your performance on the above criteria.

<b>A</b>	=	<b>100.0 to 92.5</b>
<b>A/B</b>	=	<b>92.4 to 87.5</b>
<b>B</b>	=	<b>87.4 to 82.0</b>
<b>B/C</b>	=	<b>81.9 to 78.0</b>
<b>C</b>	=	<b>77.9 to 70.0</b>
<b>D</b>	=	<b>69.9 to 60.0</b>
<b>F</b>	=	<b>Below 60</b>

### **Text**

There is a text for this class. “*The Insects, Structure and Function*” (2013) by R.F. Chapman is an excellent text for covering the highlights of insect physiology, development, biochemistry, and morphology.

### **Structure**

Although this is a formal lecture course (whatever that is), please feel free to ask questions anytime. After all, you are paying for the course so get your money's worth. E-mail me if you are bashful.

### **Office hours**

The best time to find me is after class. You can drop by room 740 any time and if I am not busy, I will answer all your questions. The best way to get my attention is through e-mail. I am at Goodman@entomology.wisc.edu.

### **Topically oriented books:**

1. *Advances in Insect Physiology* (annual or biannual).
2. *Annual Review of Entomology* (annual)

### **Journals specifically dealing with the subject:**

1. *Journal of Insect Physiology*, Pergamon Press, Oxford.
2. *Insect Biochemistry and Molecular Biology*, Pergamon Press, Oxford.
3. *Archives of Insect Biochemistry and Physiology*, A.R. Liss, New York.
4. *Insect Molecular Biology*, Blackwell, London.

