

## Biology 230

### Zoology

Instructor: Dr. Dave McShaffrey  
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Textbooks: *Integrated Principles of Zoology* by CP Hickman, Jr., LS Roberts, SL Keen, A Larson, H l'Anson, and DJ Eisenhour. 2008, 14<sup>th</sup> Edition.

***A field guide to insects, fish, reptiles or mammals of your choice.***

Format: 4 credit hours; 3 hours lecture/3 hours lab per week.

Prerequisites: You must be a sophomore or have permission of the instructor to take this course.

Attendance: You are expected to attend all class and lab meetings. You must notify me in advance of any absence.

Quizzes: Approximately every week; will cover all previous material and assigned reading for that date. Some quizzes may be take home (i.e. homework). No make-up on quizzes!

Exams: Two mid-term tests and a final; make-up by **prior** arrangement or legitimate excuse such as your own death or illness. All quizzes/tests are comprehensive. There will also be a test on identification/scientific names.

Papers: You will be required to write a very short paper based on primary literature, a short paper comparing two animals, a web page on one of those animals, 1 lab report, a bibliography and a short paper on animal care.

## Grading:

Item	Points	Due Date
Web Page <sup>†</sup>	50 pts	
Bibliography & Outline <sup>†</sup>	25 pts	
Primary Literature paper <sup>†</sup>	25 pts	
Paper <sup>†</sup>	100 pts	
Quizzes	100 pts	weekly
1st Mid-term	100 pts	
2nd Mid-term	100 pts	
Final	200 pts	
Lab report 1 <sup>†</sup>	100 pts	
Taxonomy Assignment	50 pts	
Life List	50 pts	
Practical	50 pts	
Animal Care/Curation Paper <sup>†</sup>	50 pts	
<b>Total</b>	<b>1000 pts</b>	

Field Experiences: You may complete field experiences for bonus points.

Your final grade will be determined as follows:

A+	97%	B+	87%	C+	77%	D+	67%	F	< 60%
A	93%	B	83%	C	73%	D	63%		
A-	90%	B-	80%	C-	70%	D-	60%		

### General Statement

Animals comprise most of the species on the planet. Compared to other groups of organisms, animals attract our interest because many of them are able to move and perform various behaviors. In addition, as animals ourselves, we pay attention to animals because we know that in an ecological setting other animals can be competitors, prey, predators or parasites.

We will spend time this semester on the mechanisms of evolution, on taxonomy, on physiology and on such processes as body temperature regulation and development. Since our department does not currently offer courses in evolution or development, this may be your most in-depth look at these areas.

With biological knowledge doubling every 4 years, simply managing the information explosion becomes a critical skill. You will gain experience with this in several ways. First, you

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<sup>†</sup> This is a writing-intensive course - failure to complete any of these assignments will result in a grade of "F"

will write papers for which you will have to do significant research. Second, you will use a suite of computer programs to learn evolutionary relationships and scientific names.

### **Goals, Methods, and Criteria**

**Goal 1.** Each student will be familiar with the taxonomy of the animals.

Methods to achieve this goal:

1. Individual use of digital images for self-study.
2. Use of computerized "hypertext" programs and name quizzes.
3. Lectures/slide presentations on each group.
4. Reading the textbook.
5. Field experiences.
6. Examination/Curation of preserved specimens.

Evaluation/criteria for success:

- A. Each student will receive a passing grade on quizzes and tests.
- B. Each student will pass the name/ID test at the end of the semester.

**Goal 2.** Each student will learn the basics of reproduction, development, homeostasis, circulation, gas exchange, evolution, development and ecology as they apply to animals. Each student will learn the historical development of key ideas such as evolutionary and systematic theories, and will also learn about the role zoology plays in society. Finally, each student will know the characteristics associated with major groups.

Methods to achieve this goal:

1. Assigned readings from the text.
2. Occasional assigned readings from other sources.
3. Small group/class discussions.
4. Lectures by the instructor.
5. Field experiences.

Evaluation/criteria for success:

- A. Each student will pass objective tests and quizzes on the assigned material.

**Goal 3.** Each student will learn how to gather zoological information from our library, and how to assemble that information into a well-written report.

Methods to achieve this goal:

1. A short, early paper based on the primary literature to help identify writing problems.
2. Selection of an animal taxon by each student; this will be paired with a taxon selected by the instructor.
3. Location of at least 20 references in our library (or from full-text internet sources); 10 of which are peer-reviewed papers in refereed journals.
4. Assembling these references into a bibliography.
5. Completion of a 15-20 page (typed, double-spaced) research paper on the biology of the selected taxa.
6. Revision of the paper after review by the instructor.
7. Production of a web page.

Evaluation/criteria for success:

- A. Completion of a satisfactory paper. Details on evaluation are included with the paper assignment.
- B. An informative and well-delivered presentation.

**Goal 4.** The class will be fun.

Methods to achieve this goal:

1. An atmosphere of academic respect and cooperation.
2. Fun field trips.

### **Field Experiences**

You cannot learn everything in biology in the classroom. This is particularly true of animals. To understand them, you must observe them in their natural habitats. In addition to the laboratory, I have tried to provide some alternates, in the form of field experiences that you can participate in for bonus points. I will give you up to 20 points for completing them. Students who are physically disabled can make separate arrangements.

Valid field experiences include participating in the Marietta Natural History Society nature walks, attending MNHS programs, attending weekend hikes led by a member of the biology department, or by pre-arranged substitutes. A MNHS program counts 5 points, a morning nature walk is worth 10 points, and an evening walk is worth 5 points. A weekend hike will be worth from 5-20 points depending on length and other factors.

## The Paper

Two consistent themes emerge whenever college teachers and employers mingle. Employers are consistently looking for students who can write well, and who can work in groups. This assignment is meant to give you practice at the former, as well as another important skill - acquiring and interpreting information

As a writing intensive course, you will be expected to clearly communicate your ideas in writing. We will start with a short paper based on the primary literature. This assignment (details given in class) will help me assess your writing skills. You will further develop those skills with the major paper described here, and with the lab reports (see the lab section at the end).

The first step in writing the paper is for you to choose a taxon to research. This taxon will be paired with a taxon identified by the instructor. The paper that you will write as part of this project will compare and contrast the two taxa overall, and should cover at least **three** of the following categories:

1. morphology, anatomy and physiology
2. behavior
3. ecology
4. conservation and relationships with humans

You should research the species thoroughly, consulting sources beyond your textbook and small guidebooks. I expect to see evidence of significant library work, including recent references from the primary sources (scientific journals). There need to be at least 20 valid scientific references (primary, secondary or tertiary works produced for a scholarly audience). Ten of the references need to be from primary sources. Pay particular attention to how you organize and arrange topics and the transitions between topics – be sure to have a logical development of your paper. Your paper should be illustrated with appropriate drawings, photographs, maps, tables, etc. as you see necessary. I prefer original illustrations to those photocopied or downloaded from your sources. Of course the paper will be typed, with no grammatical or spelling errors. Keep the **text** of the paper between 15-20 pages. Cite all references in the text following the style used in Biology 105.

### Primary Sources and Citing References

I make a big deal out of insisting on proper reference citation and the use of primary sources. Since scientific writing differs from the experiences you may have had in English classes; let me clarify these two points.

Every idea you get from another source must acknowledge that source in the text where the idea is stated. This is known as citation, and failure to do so is plagiarism. The general rule is that any information that is not general knowledge (that is, anything you found in an article, book etc.) must have the reference cited. For instance, the fact that a mayfly is an insect is general knowledge, the fact that the mayfly *Stenacron interpunctatum* prefers slow currents is not, and must be cited. If you do original experiments or make original observations, you do not

need to cite these, but you must also include a methods section so that others may try to reproduce your results. Note that original *conclusions* that *you* draw based on information presented need not be cited. For instance, if Jones reported in 1985 that a species of ant is dependent on a certain plant, and Smith reported in 1986 that the plant is going extinct, then you could conclude that the ant is also going extinct – but even here you would have to cite Jones and Smith as evidence for your conclusion. Similarly, if Thompson says that there are 315 species of bees in Borneo, and you write, “there are over 300 species of bees in Borneo”, or “there’s bunches of bees in Borneo”, you must acknowledge Thompson, even though you didn’t quote her exactly. If you hadn’t gotten the idea from her, you wouldn’t have had a clue as to how many bees there were (short of counting them, then your paper would be a primary source). If in doubt – cite the source!

Consider the following paragraph from a paper I wrote:

“Little ecological information on *E. needhami* has been published. Ecological studies concerning the diet of organisms may give clues to the function of their mouthparts. According to Cummins et al. (1984) the *Ephemerella* belong to the collector-gatherer and scraper functional feeding groups (FFGs). Hawkins (1985) described a western species, *E. infrequens*, as a diatom scraper, detritus shredder, and collector-gatherer. Sweeney & Vannote (1981) studied 6 species of ephemereids, 2 of which belong to the genus *Ephemerella*; all of the ephemereids in their study fed on diatoms and detritus. Other Ephemeridae have usually been considered to be collector-gatherers (Cummins et al., 1984).”

The first sentence has no citations; it is a fact derived from my study of the literature. The next sentence is transitional and introduces no new information, just an obvious truism. The remaining sentences summarize the results of other worker’s studies, and I gave them each credit for what they discovered. Note that each citation is accomplished by stating the author(s) name(s) and the date of the paper in such a way that it is clearly associated with the idea being discussed. Often, the name is part of the sentence, and only the date is enclosed in parentheses; however, it is also proper simply to put both the name and the date in parentheses, as is done in the last sentence. The abbreviation “et al.” is used when more than two authors wrote a paper.

This form of citation is very common (but not universal), and I want you to use it. Read through several articles in *The Ohio Journal of Science* to get a feel for the general style of scientific writing, as well as how to handle references. We will make one small modification of that system: **PLEASE INCLUDE THE PAGE NUMBER(s) WHERE YOU FOUND THE INFORMATION YOU ARE CITING.**

The next most common mistake I encounter (after failing to cite a reference at all) is what I call “lumping”. This occurs when all of the information you use in a paragraph comes from the same source, and you try to reference that source simply by putting it at the end of the paragraph. That is *not* acceptable. You must acknowledge a source within the sentence (or clause) in which you use it. If that means that each sentence in your paragraph ends with (Brown, 1986, p. 54), so be it. If that monotony bothers you (and it should), you *can avoid it by finding more sources to cite*, or citing the one source in different ways: Brown (1986 pp. 54-58), according to Brown (1986 p. 1017), Brown (1986 p. 56, 59, 314) also found, and so on. The reason for this is simple – in a scientific paper, any information that is not cited directly is

assumed to have been generated by the author(s). A single citation at the end of a paragraph makes it unclear as to which ideas came from the author, and which were taken from another source.

A note on quotes: In the humanities, frequently the exact wording of the ideas of the author under consideration is critical to the reader's understanding of the points being made in the paper. In this context, it is necessary to use exact quotes (with citations!). In the sciences, we are supposed to be "objective". This means writing methods sections in the passive voice to avoid the use of the pronoun "I", which distracts the reader from the work that was done and focuses attention on the scientist who performed it. Quotes also take emphasis away from the results and put emphasis on personalities. Unless the exact wording of the author you are citing is critical to the concept you are reviewing, paraphrase the author(s) and cite appropriately. Note that changing one or two words is not enough to paraphrase correctly – it must be a substantial revision, or again, you will be guilty of plagiarism. One way to avoid inadvertently quoting an author exactly is to paraphrase as you make notes, and then paraphrase your notes as you write your paper.

At the end of the paper, you must have a section listing all the papers you have cited. Again, follow the format in the *Ohio Journal of Science*. Do yourself a favor, and find an article now (preferably one dealing with your topic), and photocopy it, so that you can use it as a guide to solving different style problems. Note that journal articles are handled differently than books in the Literature Cited section. Pay attention to where the periods and commas go, but don't get too paranoid about these – be consistent.

O.K. – I know what you're thinking – where do I find these references – in *our* library? First of all, our library is an excellent source, and nothing to be ashamed of. What it lacks in size it makes up for in ease of use. The following tips will help you get started:

Avoid the encyclopedias – you're not in high school.

Go to the online catalog, and look up your subject.

Go to the stacks – find the book.

Look at the books around it (they're organized by subject)

Examine your textbook. Note the selected references at the end of each chapter.

Examine books in the Biology Reading Room (??????) and in the lab.

Examine their bibliographies.

From the sources above, note which journal names keep popping up.

Find those journals in the library.

Examine recent issues for articles of interest.

Examine their bibliographies.

Do a search:

Through [Biological Abstracts and Biosis Previews](#) or [Google](#)

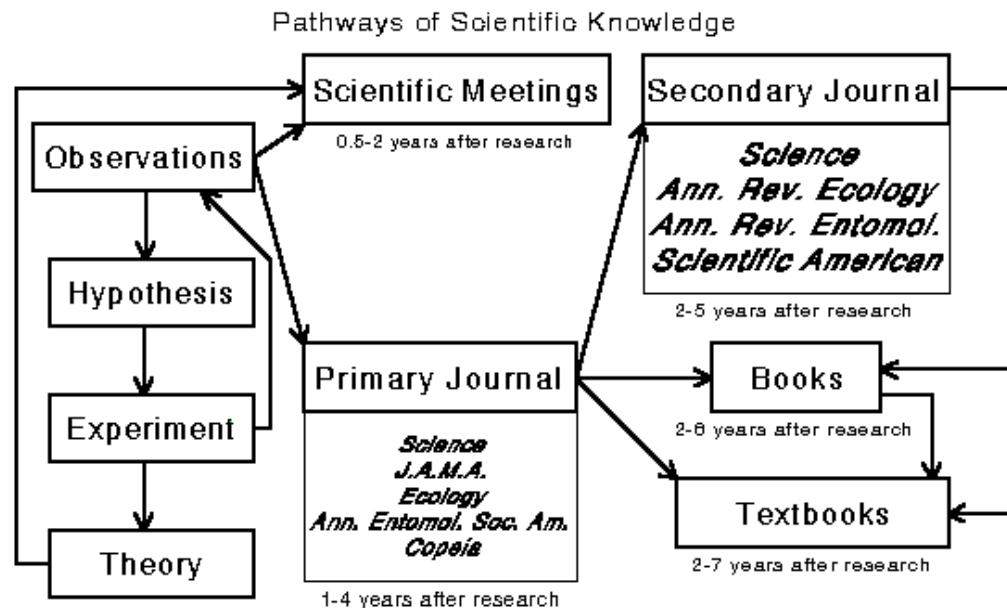
By computer ProQuest Direct, Alta Vista, Yahoo, etc. Don't ignore the references the Biology department has put online for you (see our home page:

<http://www.marietta.edu/~biol/index.html> and go to the information resources link –

<http://www.marietta.edu/~biol/library/info.html>).

In this class, I do not require that you use interlibrary loans, although you are free to do so if you wish. On this project, I will not accept the excuse "I'm waiting for an interlibrary loan." Concentrate on finding the references in our library or from online versions of journals. If you can't find enough, perhaps you need to choose a different topic.

Finally, what is a primary source, and what's all the fuss about? A primary source is one written by the person who has uncovered new knowledge – who has made a new observation or conducted an experiment (and thus didn't have to cite it when writing it up). As you can see from the diagram below, a primary journal contains the most recent, up-to-date *written* information. The stuff in books and textbooks may be up to ten years old, and may have been superseded by subsequent studies. Also, the material in most primary journals is subject to peer review – that is, review by other scientists for scientific (as opposed to editorial) accuracy.



The problem with primary sources is that they are written by specialists, for specialists, and appear in many different journals, some of which are hard to come by. Secondary journals help with this problem by consolidating information on a given topic. Such articles are usually written by experts in a field, but often are written for non-specialists or even lay people; most all are carefully referenced. The price is timeliness. Books consolidate matters even further. Many conform to strict citation of sources, but some do not, making it difficult to backtrack to original papers. Textbooks are in the same boat. While you may find useful information in non-technical sources (*Time* magazine, *U.S.A. Today*, etc.), these rarely cite their sources and are thus scientific hearsay – inadmissible in court, so to speak. The same for encyclopedias, comic books, the little books that come with insecticides, and so on – yes, even your trusty invertebrate or vertebrate zoology class notes.

If it's not clear already, let me be specific. You must have at least 20 sources, and these 20 sources may not include any non-scientific sources. You may cite these, but you must have at least 20 other valid references. At least 10 references must be from the primary literature. To help keep you on track, a bibliography will be due before the paper is due. While the bibliography will not be graded, if it does not have 20 relevant references (including 10 primary sources) then your paper's grade will be reduced by 10%.

## What about the Internet?

The Internet is a great way to find information, but as a general rule you cannot use it as a source for your paper (see exceptions below). There are two main problems with using the internet. One is the reliability of information, the other is the transitory nature of websites.

Information on the internet ranges from very reliable to plain junk. It is often impossible to tell exactly who is placing the information there, and therefore what their motives and biases may be. In contrast, peer-reviewed scientific journals (primary and secondary sources) have at least some credibility as the authors, reviewers and editors are all placing their scientific credibility on the line. Also, a public journal is printed and put in libraries in such a way that it can always be looked up in the future. By contrast, a web site may be removed, or the URL changed, a day after you get the information. Your reader would not then be able to refer to your source.

There are exceptions to the rule that you can't site internet sources. First, as mentioned above, you may cite internet sources for non-scientific info, just as you can use tertiary sources in moderation to refer to social or other information. Secondly, there are a number of places on the internet, such as the *Electronic Journal Center* that have electronic copies of articles that also appear in print. These are OK because they are peer-reviewed (reliable) and printed (permanent). *You should cite them as if you were looking at the printed journal.* There are also purely electronic journals. These are peer-reviewed (reliable) and the publisher has made arrangements satisfactory to the scientific community to ensure that they will always be available (we hope).

At each stage, your paper will be graded. When you submit the final draft, you must also turn in the marked copy of your earlier draft so that I can check to be sure that you have made corrections. Failure to do so will result in a grade penalty. Illustrations from one draft can be "recycled" in the final draft; they need not be redone. The standards will increase with the final draft. Only the final grade will be recorded.

The following table may help you understand the criteria I use in grading:

	A	B	C	D	F
Length	as assigned	as assigned	as assigned	somewhat short or long	too short or long
Spelling	few mistakes	some mistakes	some mistakes	many mistakes	atrocious
References	as assigned	as assigned	as assigned	deficient	few
Organization	excellent	good	adequate	poor	non-existent
Grammar	few, minor errors	minor errors	few major errors	several major errors	many major errors
Coverage of topics	excellent	good - some items not covered in depth	adequate - all items covered	obvious weak areas	whole sections skipped
Appearance	neat, crisp	neat	neat	scraggly, unstapled	dog-eared, torn, unstapled
Readability	Flows	reads well	choppy in spots	hard to follow	places unreadable in
Reference citation	diligent	some missed	some missed	many missing or lumped	plagiarism
Paraphrasing source	Well - paraphrased	Not too far from the original quote	Quotes (with quotation marks)	Misquotes (with quotation marks)	Quotes (withOUT quotation marks)

In grading a paper, I take all of the above into account, although I weigh some more than others. For instance, I will not give a paper an "A" if it contains major grammatical errors or doesn't meet assigned standards such as number of references or page length.

**Also, failure to include the page numbers in your citations will result in a significant grade reduction.**

Plagiarism: Plagiarism is the misrepresentation of work done by others as your own. This can come in a variety of forms, including:

1. Copying another student's work.
2. Copying from a source without quotes or attribution.
3. Paraphrasing from a source without attribution.
4. Including photos or other images made by someone else without attribution.
5. Insufficiently paraphrasing the work of another whether or not it is attributed.

Plagiarism is one of many forms of academic dishonesty – Academic dishonesty is not allowed at Marietta College and will be dealt with appropriately. Sanctions may include a lowered grade (including a 0) for an assignment, failing the course, or even expulsion from the college.

"Dishonesty within the academic community is a very serious matter, because dishonesty destroys the basic trust necessary for a healthy education environment. Academic dishonesty is any treatment or representation of work as if one were fully responsible for it, when it is in fact the work of another person. Academic dishonesty includes cheating, plagiarism, theft, or improper manipulation of laboratory or research data or theft of services. A substantiated case of academic dishonesty may result in disciplinary action, including a failing grade on the project, a failing grade in the course, or expulsion from the College" (*Marietta College Undergraduate Programs, 2008-2009 Catalog*, p. 138).

**This paper and the two lab reports must be submitted to Turnitin.com**

**Note: If you copy another student's work or cheat in any way, I will flunk you for the course and you could be expelled. Really. Please do your own work.**

**Class ID - 2347277**

**Enrollment Password - rotifer**

"A student on academic probation may enroll in no more than 14 credit hours each semester. The following co-curricular restrictions will apply to a student on academic probation:

- a) They are ineligible to participate in any college athletic team or club sport;
- b) They may not hold office in any campus organization or social fraternity or sorority.
- c) They may not travel off campus to a meeting or trip with any college organization or club unless required to do so for an academic program.
- d) They may not represent the college in any on-campus or off-campus public events or other co-curricular activities (e.g. plays, musical performances, student newspaper) unless required to do so for an academic course.
- e) They may not register for courses that require co-curricular participation unless required by their major.

The restrictions continue in force until the student has returned to "good academic standing", with the exception that when a student on academic probation earns a semester grade point average of 2.0, or better, co-curricular restrictions will be removed for the following semester." (*Marietta College Undergraduate Programs, 2008-2009 Catalog*, p. 144).

**Paper Assignments**

	Taxon	Taxon	Student
<b>1</b>			
<b>2</b>			
<b>3</b>			
<b>4</b>			
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<b>17</b>			
<b>18</b>			
<b>19</b>			

“Students who believe that they may need accommodations due to a documented disability should contact the Academic Resource Center (Andrews Hall, Third floor, 376-4700) and the instructor as soon as possible to ensure that such accommodations are implemented in a timely manner. You must meet with the ARC staff to verify your eligibility for any accommodation and for academic assistance.”

**Tentative Schedule**

	Date	Day	Topic	Reading	Lab
1	Aug. 26	T	Introduction Evolution - the basics	Handout Chapter 6	Introduction/Collection Tech
1	Aug. 28	TH			
2	Sept. 2	T	Evolution - the basics	Chapter 6	Field Station
2	Sept. 4	TH			
3	Sept. 9	T	<b>Primary Paper Due!</b> Body Plans	Chapter 9	Field Station
3	Sept. 11	TH			
4	Sept. 16	T	Classification	Chapter 10	Field Station
4	Sept. 18	TH			
5	Sept. 23	T	<b>Exam 1 Chapters 6,9, 10</b>		Field Station
5	Sept. 25	TH	Insects	Chapter 21	
6	Sept. 30	T	<b>Bibliography Due</b> Marine Invertebrates 1	Chapters 12, 13	Field Experiment
6	Oct. 2	TH			
7	Oct. 7	T	The Flatworm Radiation	Chapters 14,15	ID/Data Analysis
7	Oct. 9	TH			
8	Oct. 14	T	Fall Break		
8	Oct. 16	TH	<b>Draft Paper Due</b> Molluscs and Worms	Chapters 16,17,18	
9	Oct. 21	T			<b>Bones - Lab Report 1 Due</b>
9	Oct. 23	TH	Arthropods	Chapters 19, 20	
10	Oct. 28	T	Deuterostomes/Chordates	Chapters 22, 23	ID
10	Oct. 30	TH			
11	Nov. 4	T	Fish <b>Papers Due!!</b>	24	ID
11	Nov. 6	TH			
12	Nov. 11	T	<b>Exam 2</b>	Ch. 12-21	ID/ Data Analysis
12	Nov. 13	TH	Amphibians	Chapter 25	
13	Nov. 18	T	Reptiles	Chapter 26	ID/ Data Analysis
13	Nov. 20	TH			

14	Nov. 25	T	Birds	Chapter 27	<b>Web Page Due</b>
14	Nov. 27	TH			
15	Dec. 2	T	Mammals	Chapter 28	Tree of Life – <b>Animal Care Due</b>
15	Dec. 4	TH			

**Final: Friday, Dec. 12, 12:00 to 2:30 PM**

**Lab Practical: Friday, Dec. 12; 3:00 to 5:30 PM**

**Note: Lab practical may be held earlier, weather permitting.**

**I know it is inconvenient to have the final on this day. DO NOT PURCHASE AN AIRLINE TICKET TO FLY ON THIS DAY – Likewise, tell potential rides that you will NOT be able to leave until after the practical. Because of the nature of the practical, it is NOT possible to take it earlier in the week.**

What about the origins and chemistry of life? Cells? Cellular metabolism? Genetics? Nervous Coordination? Immunity? Animal Behavior? Animal Ecology? Development? Well, we can't cover all of these in a single semester. You will find that these topics are covered in detail in semester long courses of their own.

**Taxa To Be Covered**

**Phylum Porifera**

- Class Calcarea
- Class Hexactinellida
- Class Demospongiae

**Phylum Placozoa**

**Phylum Cnidaria**

- Class Hydrozoa
- Class Scyphozoa
- Class Cubozoa
- Class Anthozoa

**Phylum Ctenophora**

**Phylum Acoelomorpha**

**Phylum Platyhelminthes**

- Class Turbellaria
- Class Trematoda
- Class Monogenea
- Class Cestoda

**Phylum Mesozoa**

**Phylum Nemertea**

**Phylum Gnathostomulida**

**Phylum Rotifera**

**Phylum Acanthocephala**

**Phylum Gastrotricha**

**Phylum Entoprocta**

**Phylum Ectoprocta**

**Phylum Brachiopoda**

**Phylum Phoronida**

**Phylum Mollusca**

- Class Monoplacophora
- Class Polyplacophora
- Class Scaphopoda
- Class Gastropoda
- Class Bivalvia
- Class Cephalopoda

**Phylum Annelida**

- Class Polychaeta
- Class Oligochaeta
- Class Hirudinea

**Phylum Echiura**

**Phylum Sipuncula**

**Phylum Nematoda**

**Phylum Nematomorpha**

**Phylum Kinorhyncha**

**Phylum Priapulida**

**Phylum Loricifera**

**Phylum Onychophora**

**Phylum Tardigrada**

**Phylum Arthropoda**

**Subphylum Trilobita**

**Subphylum Chelicerata**

**Class Arachnida**

**Subphylum Myriapoda**

**Class Chilopoda**

**Class Diplopoda**

**Class Pauropoda**

**Class Symphyla**

**Subphylum Crustacea**

**Class Branchiopoda**

**Class Ostracoda**

**Class Maxillopoda**

**Class Malacostraca**

**Subphylum Hexapoda**

**Class Insecta**

**Order Ephemeroptera**

**Order Odonata**

**Order Orthoptera**

**Order Dermaptera**

**Order Plecoptera**

**Order Isoptera**

**Order Mallophaga**

**Order Anoplura**

**Order Hemiptera**

**Order Homoptera**

**Order Neuroptera**

**Order Coleoptera**

**Order Lepidoptera**

**Order Diptera**

**Order Trichoptera**

**Order Siphonaptera**

**Order Hymenoptera**

**Phylum Chaetognatha**

**Phylum Echinodermata**

- Class Crinoidea**
- Class Asteroidea**
- Class Ophiuroidea**
- Class Echinoidea**
- Class Holothuroidea**

**Phylum Hemichordata**

**Phylum Chordata**

**Phylum Chordata**

**Subphylum Urochordata**

**Subphylum Cephalochordata**

**Subphylum Vertebrata**

**Superclass Agnatha**

- Class Myxini
- Class Cephalaspidomorphi
- "Class" Ostracodermi

**Superclass Gnathostomata**

- Class Chondrichthyes
- Subclass Elasmobranchii
- Subclass Holocephali
- "Class" Placodermi

Osteichthyes

- Class Actinopterygii
  - Subclass Chondrostei**
  - Subclass Neopterygii**
- Class Sarcopterygii
- Class Amphibia
  - Order Gymnophiona**
  - Order Caudata (Urodela)**
  - Order Anura**

"Class" Reptilia

**Subclass Anapsida**

Order Testudines

**Subclass Diapsida**

Superorder Lepidosauria

Order Squamata

Suborder Lacertilia

Suborder Amphisbaenia

Suborder Serpentes

Order Sphenodonta

Superorder Ichthyosauria

Superorder Sauropterygia

Order Plesiosauria

Superorder Archosauria

Order Thecodontia

Order Crocodylia

Order Pterosauria

Order Saurischia

Suborder Sauropodomorpha

Suborder Theropoda

Birds

Order Ornithischia

**Subclass Synapsida**

Order Pelycosauria

Order Therapsida

Mammals

Class Aves

Class Mammalia

**Subclass Prototheria**

Infraclass Ornithodelphia

Order Monotremata

**Subclass Theria**

Infraclass Metatheria

Various Marsupial orders

Infraclass Eutheria

Order Insectivora

Order Dermoptera

Order Chiroptera

Order Primates

Order Xenarthra

Order Lagomorpha

Order Rodentia

Order Carnivora

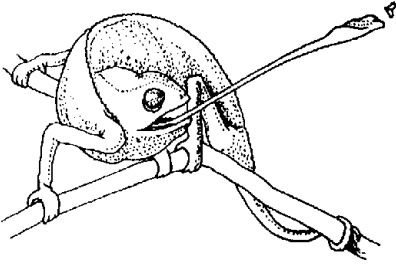
Order Proboscidea

Order Sirenia

Order Perissodactyla

Order Artiodactyla

Order Cetacea



## Biology 230 Zoology Lab Syllabus



Textbooks: Same as for Class.

In addition, you must obtain a field guide (to insects, fish, mammals, or reptiles and amphibians)

Lab Fee: A lab fee of \$?? will be charged to offset costs of field trips and supplies.

Attendance: You are expected to attend all lab meetings. You must notify me in advance of any absence. Unexcused absences will cost you 10 pts; excused absences will cost you 5 points and may be made up by field experiences at a 0.5 to 1 point ratio.

Exams: One practical (final); make-up by **prior** arrangement or legitimate excuse such as your own death or illness.

Field Experiences: You may complete field experiences for up to 10 bonus points. A single field experience cannot count for both lab and class, and if you have an excused absence from lab, any field experiences will only count 1/2 until the deficit is made up.

Grading:

	Scale:	
Lab reports, 1 @100	-	100 pts
Taxonomy Assignment	-	50 pts
Life List	-	50 pts
Practical	-	50 pts
Animal Care/Curation Paper	-	50 pts

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300 pts

These points incorporated into class grade.

Lab reports are to follow formatting and instructions as used in Biology 105/106. See me if you need a copy of these instructions; they are also located on the website.

Taxonomy assignment: Each student will serve as an “expert” identifying organisms within an invertebrate group of the student’s choosing. The class as a whole will have to find 75 species of invertebrates; 1 point will be deducted for each species short of the goal.

	Student	Taxon	# of Species
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Life List: The class will identify at least 25 vertebrates in the field. Bonus points for more.

Animal care/curation: You will be assigned a group of animals to care for and a series of specimens to curate; the grade will be awarded on the basis of that care and a 5 page paper summarizing what you learned.

## Animal Care List

<b>Area</b>	<b>Team Responsible</b>		
	August 25- Sept 23	Sept 23 – Oct. 28	Oct. 28 – Dec. 12
<b>Display Tank</b>	1	2	3
<b>Intro Lab</b>	2	3	1
<b>Zoology Lab</b>	3	4	2
<b>Greenhouse</b>	4	1	4

<b>Team 1</b>	
<b>Team 2</b>	
<b>Team 3</b>	
<b>Team 4</b>	