

Invertebrate Ecology:
“The little things that run the world” – E. O. Wilson
Studying biology from a different perspective

DOCTOR FUN

28 July 98



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 http://sunsite.unc.edu/Dave/drfun.html
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When roaches have had enough

Invertebrate Ecology Syllabus
 Bio 50-444-01 Spring 2011
 Lecture 12:50-2:05 pm Tu/Th; Lab Tues 2:15-5:15

Dr. Romi Burks, Associate Professor, Department of Biology, FJ – 141; Lab FJ-145

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**Please do not call before 8 a.m. or after 9 p.m. unless it is an emergency. Emails are generally answered pretty quickly but allow at least 12 hours.*

Office Hours*: M & F 12-3; or otherwise by appointment

**Unless teaching or in a meeting, I should generally be in my office or lab (145). Feel free to stop by and I will meet with you if at all possible or we can arrange another time.*

Texts: 1) Pechenik, J. A. 2010. *Biology of the Invertebrates*, 6th edition. McGraw Hill Publishers
 2) Primary Literature and Laboratories on Moodle (lms.southwestern.edu).

SYLLABUS PHILOSOPHY: This document should act like an owner's manual for a car. At least read through it once and then keep it available for reference. More or less, everything that you need to know about the course you should be able to find in this document. Reading materials and the day to day schedules will be posted on Moodle

COURSE DESCRIPTION:

We often fail to realize that invertebrates rule the animal kingdom with more than one million described species in 30+ phyla. Vertebrates, the animals we all love and easily recognize, occupy a disproportionate amount of biology curricula, even though they only represent a single subphylum of the phylum Chordata. In this course, we will undertake a valiant attempt to compensate for this colossal oversight by studying most of the earth's animal diversity in this single course. The underlying theme of the course that examines invertebrates focuses on "learning the place." Several key aspects include:

1. What are the **unique features** that **places** these organisms as a distinct group?
 - a. Morphological
 - b. Physiological: Respiration, Circulatory, Sensory
 - c. Developmental
2. What **place** does the organism have in the food web?
 - a. How does the animal get food? Is it a predator, herbivore, or filter feeder?
 - b. Are there unique structures for food acquisition?
 - c. How is food processed and digested?
3. What kind of habitats and **places** do different invertebrates dominate?

Thus, **Invertebrate Ecology** will explore the amazing diversity found across marine, terrestrial, and aquatic habitats. We will examine taxonomic descriptors of different groups but will more specifically focus on the ecology of these organisms through **critically reading of the primary literature**. Through the semester, we will confront topics that impact many invertebrates such as exotic species, habitat degradation, chemical communication, predator- prey interactions, and competition.

STUDENT LEARNING OBJECTIVES:

- **Biology Department:** Students will understand and apply knowledge and concepts about the functioning of living systems.
 - **Invertebrate Class:** Student will be able to describe the diversity of invertebrates and their contributions to ecosystem functions.
- **Biology Department:** Students will accurately and thoughtfully identify, evaluate and critique research and research literature on biological phenomena.
 - **Invertebrate Class:** Students will select peer-reviewed, quality papers of an experimental nature that focus on a particular ecological topic and include invertebrates.
- **Biology Department:** Students will clearly, accurately and in appropriate styles, communicate about biological phenomena and research orally, in writing and graphically.
 - **Invertebrate Class:** Students will correctly perform statistics for data analysis and present results of group experiments with appropriate depth and proper style.
- **Biology Department:** Students will accurately, appropriately and safely perform physical techniques of biological investigation.
 - **Invertebrate Class:** Students will learn how to sample and identify invertebrates.

- **Biology Department:** Students will accurately and appropriately apply quantitative reasoning and methods to biological problems.
 - **Invertebrate Class:** Students will execute basic statistics using SPSS and interpret the results.

CAPSTONE CONTRIBUTION:

This course is an advanced integrative course in Organismal Biology that partially fulfills the capstone requirement in Biology. In this course you will integrate together and build upon material and skills you have learned in the required prerequisites of (First-year Biology, Biology Methods Course, Statistics, General and Organic Chemistry, Biochemistry).

LECTURES (mostly Tuesdays): For each of the major phyla, a lecture will be given by Dr. Burks based on the reading from Pechenik (2010). PowerPoint slides for each of these lectures will be available for students to download before class and review. **Also, for most lecture days, there will be a quiz on the material that will be determined by group collaboration** (except for the first 2; See guidelines later in the syllabus). Groups will earn points for their ability to cover the material, their key to the quiz, and the chapter summary that they provide for class.

DISCUSSIONS (mostly Thursdays): We will use other days in class to examine the primary literature regarding ecology and invertebrates. On these days, students will be responsible for reading the primary literature and coming prepared for discussion. In general, each primary literature paper represents an opportunity to write a critique. The primary literature will cover the phyla for that week but is open in terms of the areas that it covers. **Pairs will determine the primary literature and discuss it in the context of a particular area of ecology that they will briefly review in a PP presentation.** Topics will be approved based on a 1st come, 1st serve basis.

STUDENT "BILL OF RIGHTS" (Expectations for Invertebrate Ecology)

1. Each student can expect access to the PP presentations prior to class (Moodle)
2. Each student can expect class to begin on time.
3. Each student can expect that Dr. Burks will arrange appropriate office hours if there are schedule conflicts.
4. Each student can expect to have *one "Bad Day" in which they can request a "Had A Bad Day Pass" that grants a 3-day extension on any assignment that does not affect others.*
5. Each student can expect to spend at least 3 hours reading or studying out of class for every 1 hr. 15 minutes in class.
6. Each student can expect to improve their writing & presentation skills.
7. Each student can expect a classroom environment conducive to their learning. If this is not the case, see Dr. Burks immediately.
8. Each student can expect that Dr. Burks will be attentive to their needs and flexible if excused absences (illness, sports, etc.) occur.
9. Each student can expect to learn how invertebrates relate to their daily lives.
10. Each student can expect IE to engage in multiple pedagogical styles (lecture, debate, literature discussion, hands-on experimentation).

PROFESSOR AND COURSE EXPECTATIONS FOR STUDENTS

1. Every student will be on time to class. This means ready to go when the class begins. The on-time policy is necessary to maximize the learning potential of the classroom.

2. I expect that students will have read and taken notes on the assigned reading before we cover this material in class.
3. I also expect that you will go back and re-read assigned chapters and review your class notes within 1-2 days of being given.
4. IE expects that you will be responsible for your own mastery of the material. If you have questions about concepts presented in the text or lectures, it is your responsibility to find the answers to questions and/or seek my help.
5. I expect that students will provide adequate warning if they are going to miss a class for legitimate academic circumstances. It is the student's responsibility to review the class material and ask questions.
6. I expect the classroom environment to have a relaxed atmosphere where students can feel free to express opinions or ask questions.
7. Students must respect other people's opinions even if they differ from theirs.
8. I expect that students will take some time to reflect on what they are learning.
9. I expect students to be enthusiastic about the field opportunities that will be provided in class.
10. I expect all students to contribute to class on a frequent basis – this means in office hours and through checking email.

CRITICAL READING GUIDELINES

Whether you will enjoy and learn a great deal from this class is almost entirely up to you and your commitment to reading the course materials and engaging in classroom debate. Thoughtful reading is both active and responsive. As a general rule, thoughtful engagement either (a) uses readings as the basis for formulating interesting discussion questions; (b) uses readings as a basis to develop an interesting positive argument of your own; and/or (c) treats an author/work as an opponent worth refuting. It is not enough, in other words, for you to merely read for comprehension. I fully expect you to engage the works that we encounter in an active dialogue and to be prepared to share your impressions with the class community. To this end, you will find it useful to keep careful notes, reactions, outline arguments, etc...before you write your critiques. This is an excellent way to record and chart the development of your own dialogue with the authors and papers on which we are focusing our critical attention.

COURSE COMPONENTS, ENRICHMENT AND GRADES:

Grades are not curved. What you earn is what you will receive. However, several opportunities are possible for you to enrich your performance as necessary (Max 20 = 2% of grade).

1. Attending a department seminar and writing a "reaction paragraph" earns you 5 points.
2. You can design an ap related to invertebrates and earn up to 10 points.
3. Not using your "Had a Bad Day Pass" counts for 5 points.
4. Perfect attendance counts for 5 additional points.
5. Extraordinary efforts or enthusiasm on field trips can warrant up to 5 points.
6. Bringing a dish to the Invertebrate Culinary Lab can earn 5 points.

Total points = 1000

Minimum A = 925 Points
 Minimum B = 825 Points
 Minimum C = 725 Points
 Minimum D = 625 Points

Minimum A - = 895 Points
 Minimum B- = 795 Points
 Minimum C- = 695 Points
 Minimum D- = 595 Points

Minimum B+ = 875 Points
 Minimum C+ = 775 Points
 Minimum D+ = 675 Points
 Below 595 = F

COURSE COMPONENTS

1. Quizzes	24%	10% Create	14% Take
2. Exams	22%	11% Midterm	11% Final
3. Primary Literature Exercises	10%	110 points each; 10 pt. open ?	
4. Participation	9%	5% x 2: critique or abstract	
5. Lab	35%	3% self; 3% peers; 3% Burks	
		15% Minilabs	10% Group 10% Paper

THE DETAILS: COMPONENTS

- **Group Quiz Creation/Summaries** **2 x 50 pts = 100 pts (10%)**

Although not the most comprehensive, Pechenik (2010) still contains an incredible amount of information. The topics within this course cover an intense amount of material and could easily occupy several lifetimes of study. No one person could be an expert in all of the areas. Dr. Burks will provide a range of pages to focus on in each chapter but this still covers significant topics and depth. **Learning to recognize important concepts, trends, terms, and processes constitutes a key skill for students.** To address this, groups of students will design an appropriate quiz (20 points) that includes the following:

1. **Vocabulary** – 10 key words that the group finds critical to understanding (5 points).
2. **Classification** – Find 5 images of different Classes from the web that students should be able to identify after reading the text (5 points)
3. **Structural Uniqueness** – Question(s) designed to give students an opportunity to describe what is distinctive about the phyla (Could be MC, T/F, Match, SA, Drawing, etc...5 points).
4. **Function** (Feeding, Locomotion, Reproduction, etc...) – A single Short Answer Question about that is reasonable to answer given careful reading of the chapter (5 points).

Note: Written at the graduate level and driven more through an evolutionary lens, the textbook *Invertebrates* by Brusca and Brusca (2002) provides substantially more detail (particular structures and physiology) and Dr. Burks will use this to supplement her lectures. A copy of this text has been placed on reserve in the library.

Quiz Groups:**Chapters:**

Burks

Classification (2); Protists (3); Porifera (4);
Nematodes (16); Echinoderms (20)

A: Kevin, Tracy, Morgan, Steven

Cnidarians & Ctenophores (6 & 7); Arthropods: Myriapoda
& Chelicerates (14)

B: Preston, Stephanie, Patrick, Alex

Platyhelminthes (8); Annelids (13)

C: Cameron, Kimberlee, David, Ashley

Mollusks (12); Arthropods – General/Insects (14)

Grading:

Each student in the group will receive the same number of points. Up to 10 points will be awarded for:

1. Quiz clarity and structure (2 page limit) – easy to read, no typos, clear format.
2. Choice of questions for quiz (i.e. is material adequately covered but not too detailed?)
3. Rationale for question choice (i.e. justification for what captured interest)
4. Completeness of answer key – ease with which quizzes can be graded
5. Provision of adequate study guide

More Important Details:

1. Groups will be made up of 4-5 people and will stay the same for both quiz creations.
2. **Quizzes are due to Dr. Burks by 8 a.m. on Monday before the Tuesday lecture.** They will then be reviewed and posted as PDF files on Moodle by 6 p.m. on Monday. They should be accompanied by:
 - a. **For each section, a brief rationale** for why the group wrote the particular questions and
 - b. **An answer key scaled for grading** (i.e. how to award points, partial credit)
3. Send quizzes as e-mail attachments of a Microsoft Word file.
4. **Questions should not be obscure, but at the same time questions need to evaluate how well students read the chapter.**
5. Dr. Burks is available to consult with groups to help create 1 quality question per quiz.
6. On the day of lecture, **groups should also provide each student with a copy of a study guide for the chapter.**
7. Dr. Burks will write the first three quizzes so students have an example from which to work.
8. Groups need to grade quizzes by the following Thursday class.

Quizzes will be graded the groups with their answer key and reviewed by Dr. Burks. An evaluation of the group effort (and likely the quizzes) will be returned within 1-wk, but certainly before the group creates their 2nd quiz. As part of the group, each student will create 2 of the 11 quizzes. Seven out of the remaining 9 quizzes will contribute to their grade.

- **Individual Chapter Quizzes**

7 x 20 pts = 140 pts (14%)

Invertebrate Ecology involves a near weekly quiz component to encourage students to keep up-to-date and to engage in the material. The structure purposely provides study questions and helps prepare students early for exams. See above for details about the quiz structure.

5 Important Details:

1. Students should bring **completed quizzes (paper) to class** the day of the lecture.
 - a. Note: We may move to a on-line Moodle option if possible
2. The Honor Code Applies to taking of quizzes
 - a. Especially to quiz-writing students not to share the questions
 - b. No materials should be used when taking quizzes.
3. Quizzes should be available by 6 p.m. the night before class.
4. Write legibly – spelling does count.
5. *Note – if this process does not work out, then Dr. Burks reserves the right to write all the quizzes and have them make up for the missing points.*

- **Midterm and Final Exams**

2 x 11 pts = 220 pts (22%)

The exams will be a mixture of matching/multiple choice (40 points), an image section (20 points), a lab section (10 points), short answer (30 points) and essay questions (10 points). Primary literature discussion questions are appropriate exam material. Specifically, there will be two short answer questions (5 points each) that will require you to supply information from the primary literature papers we read in class. You will be able to type 1-pg, single-spaced responses to essays and also type short answer questions if you choose.

Before the exam, we will review in class and you can supply $\frac{1}{2}$ of the questions in advance (some version) that will be used on the exam. **The final will not be cumulative in terms of details regarding the phyla but will address broad themes.**

- **Solo Primary Lit Critiques or Abstract Analysis** **2 x 50 pts = 100 pts (10%)**

We will read a number of primary literature papers throughout the semester. **For 2 experimental papers, you will need to write either a literary critique or an abstract analysis. You can do one of each or two of the same.** Even if you do not write a whole critique, you should still bring a discussion question to class. Critiques cannot be written for the paper that you present with your partner.

EACH CRITIQUE should be specific in its evaluation and follow this format:

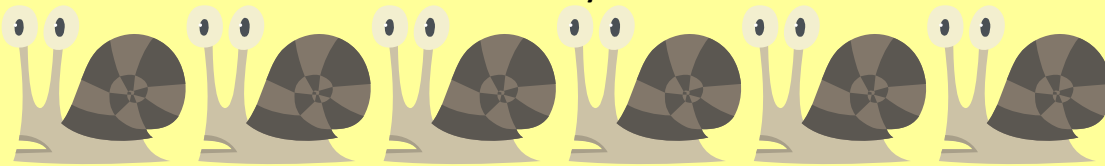
- 2-3 pages, double spaced – do not waste space with long headers.
- 1st STEP: Put paper in context and identify the “take-home” message.
- 2nd STEP: For experimental papers, summarize the methods and describe the important results.
 - How did you determine significance (include test and p-value)?
- 3rd STEP: Describe paper’s “readability.”
- 4th STEP: Specify 3 strengths & weaknesses. How could they be remedied?
- 5th STEP: Conclusion – Discuss any part of the paper that did you not understand. What is a logical follow-up to this paper? Give 2 discussion questions.
- **6th STEP: Correct complete citation at the end of the critique**
- Adhere to active-voice, proofread and provide transitions between paragraphs.

EACH ABSTRACT ANALYSIS should be specific in its evaluation and follow this format:

- 2-3 pages, double spaced – do not waste space with long headers.
- 1st STEP: Read the paper without the title and abstract.
- 2nd STEP: Based on format in ecology (active voice), write an abstract for the paper as if you were one of the authors.
 - Five abstract components: Context, Why (Purpose), How (Methods), What (Results) and Who (Implication – who cares?)
- 3rd STEP: Write a title for the paper
- 4th STEP: Compare and contrast your abstract and title with the one of the authors.
- 5th STEP: Conclusion – Discuss any part of the paper that did you not understand. What is a logical follow-up to this paper? Give 2 discussion questions.
- **6th STEP: Correct complete citation at the end of the critique**
- Adhere to active-voice, proofread and provide transitions between paragraphs.

OPPORTUNITY FOR REVISION: Please note that critiques will be examined closely. You may choose to revise one of your critiques for an averaged grade [i.e. Attempt 1 = 15/20 (75%); Attempt 2 w response to revisions = 18/20 (90%); Final Grade for Critique 1 = $15+18 = 33/2 = 16.5/20$ (82.5%)]

NOTE #1 -See “Guide to Primary Literature and Citation” ON Moodle



EXPECTATION OF PARTICIPATION

The emphasis on quality interactions between professor and student, the collaborative nature of experimentation, the expectations of upper-level courses, and the focused group discussions of primary literature *undeniably necessitate* student engagement and participation. More simply put, the class will not work without you. Active learner is not just a descriptor in this course but the essence of how you will need to operate. With small upper-level classes, it becomes that much more important for you to personally take responsibility for attending class, coming prepared for discussions, asking questions, consulting with me, and equally participating in group work.

- **Participation (9%)**

3% self; **3%** peers; **3%** Burks

Awarding point for participation can be a tricky endeavor. In the case of this class, we will periodically review participation as a self-review, peer assessment and a short assessment (see below) from Dr. Burks. Specific participation will be expected for:

1. Primary literature discussions
2. Invertebrate Updates
3. Field trips
4. Quiz and lab group participation

Participation Rating Form:

5 = only come to class but never contributes; no invertebrate updates

10 = comes to class; minimal participation in discussion; no invertebrate updates

15 = minimal participation in discussion; minimal group contributions; no invertebrates updates

20 = modest participation in discussion; reasonable group contributions; 1 invertebrate updates

25 = noticeable participation in discussion; responsible group member; 2 invertebrate updates

30 = clearly contributes to class; contributes intellectually and leads groups well; 3 invertebrate updates

Myself 5 10 15 20 25 30 Other: _____

Justification:

Note for improvement:

In addition, each student will provide a rating, justification and note of improvement for each peer (Scale 1-30). Dr. Burks will contribute a number as well. Participation score = **SUM** of the three ratings.

Details on participation:**1. Pair Primary Literature Discussion Leaders:**

Discussion topics are on a 1st come, 1st serve basis and could include, but are not limited to: Exotic Species, Predation, Competition, Disturbance, Nutrient Cycling, Global Climate Change, Disease Ecology, Mating Systems, Hybridization, Speciation, or Parasitism.

Each pair will pick a paper that focuses on that subject and the group of invertebrates being discussed that week. Each discussion will pair with these possible phyla: Platyhelminthes, Rotifera, Mollusca, Annelida, Nematoda, Arthropoda (Subphyla Hexapoda (Class Insecta), Myriapoda, Chelicerata, Crustacea), Echinodermata

For example, if subject = biodiversity and the phyla Arthropoda, then an appropriate question could be "how many invertebrate species are there really?" The presentation would then define biodiversity, supply information about past estimates, discuss the controversy over defining a species or about which habitats host the most species, and then describe the decline in pollinators. The discussion of the primary literature paper would focus more on data about invertebrate biodiversity.

You will use the introduction of the paper that you choose to discuss as a starting point for framing your discussion. Pairs may use PowerPoint slides if they wish although simple discussion works as well.

- 1) **An importance question**
- 2) **Definitions**
- 3) **Historical thought or background to theories**
- 4) **Controversies**
- 5) **Examples of invertebrates**

After providing an introduction to the topic, the pair will then guide the class through the primary literature paper. Remember that **one should rely on your peers** to have questions worthy of discussion but each pair should have their own list prepared to foster discussion. Your participation evaluation depends not only on your ability to review the paper but also to engage others. As we work through the paper in class, you will want to guide a discussion of the paper that includes the following points:

- 1) Introduction of Players (what organisms used?)
- 2) Hypotheses Tested
- 3) Experimental Design & Statistics
- 4) Relevant Figures – Discuss the data
- 5) How does this compare with other studies? (i.e. Discussion)
- 6) 3 Strengths and weaknesses of paper?
- 7) What is the Take Home Message? Next Step?

The paper must be experimental in nature and you must choose a paper at least 1 week prior to your presentation day. All members of the class will read the paper. Class members may choose to write a critique or an abstract analysis (due the day of the discussion).

2. Invertebrate Updates:

Each class will start with an invertebrate update or "what's new in the world of invertebrates" and 2 people should contribute each day. Over the course of the semester, each students should provide at least 3 invertebrate updates. These will not occur on a sign up list so people should be ready to share. So, do a little surfing and find novel news stories (professional or simply social) about invertebrates. I came across one a while ago about eating insects.

Example: "Waiter! There's a Bug in my Soup!" -

<http://www.nytimes.com/2010/09/22/dining/22bug.html>

Mealworm: It's what's for Dinner

<http://video.nytimes.com/video/2010/09/21/dining/1248069066500/mealworm-it-s-what-s-for-dinner.html>

Lab (35%)**15% Minilabs 10% Group 10% Paper**

Each weekly lab will have a 25 point worksheet.

1. Digital Photo Race
2. Phylogeny
3. Observation & Morphology
4. Dichotomous Key
5. Statistics Review
6. Diversity

The second half of the course will be occupied with field trips and group projects on Invertebrates. You can choose to do your project on any number of easily-available invertebrates (no spiders):

1. Flatworms
2. Earthworms
3. Snails (terrestrial or apple snails)
4. Insects (crickets, cockroaches, ants, dragonfly larvae-if collectable)
5. Crustaceans (*Daphnia*, isopods, crayfish)

Research Components:

Research Proposal	5%	=	50 points
Group Presentation of Results	5%	=	50 points
Final Paper & Response to Reviewers	10%	=	100 points

Research Proposal: Based on the areas of possible research above, your lab group will submit a research proposal that includes: Introduction, Hypotheses to be Tested, Materials & Methods, Expected Results & Statistical Analyses and 2 Additional Primary Literature References.

Group Presentation: Each group will give a 15-minute presentation on the results of their experiment.

Paired Peer Review: Each student will submit 2 copies of a completed research paper that appears in the following order: Submission Letter to Journal "Editor", Title Page, Abstract, Introduction, Methods, Results, Discussion, Acknowledgments, References, Tables, Figure Captions, and Figures.

This first version of the research paper will be read by 1 of your peers. This will provide you with feedback regarding basic writing skills and a minimum of 3 areas of improvement (although more areas could exist) that will need to be revised for the final version. Each student will act as an "outside" reviewer for a submission by one of your peers. This will be an anonymous process. You will write given the information provided to you by Dr. Burks on Moodle. You should follow the approach taken for critiquing papers throughout the class, fill out the peer review form and then write a 1-2 page summary review. Be specific in your compliments and criticisms.

Final Paper: Your "manuscript" will be returned to you by the Editor with one "outside" review. You will then edit your paper according to the reviewer suggestions (you are free to disagree with the reviewer but you must justify your position). Students will then turn in the final manuscript for "consideration for publication" along with a Letter to the Editor detailing how you responded to the reviews.

ADDITIONAL POLICIES:

- **OPEN COMMUNICATION**
 - Students are expected to discuss questions and areas of concern with Dr. Burks.
- **ATTENDANCE**
 - Students are expected to prepare for and attend each class meeting.
 - More importantly than just attendance, lack of preparation for class will diminish your capacity to fully engage in the intellectual pursuits and debates of class.
 - Each unexcused absence above 2 results in a 50 point penalty. Involuntary withdrawal will occur on the 4th unexcused absence.
- **TIMELINESS**
 - Arrive to class ON TIME. Anything less is disrespectful to me and your peers.
- **FIELD WORK**
 - Be prepared to get wet & dirty on field days.
- **DROP DATES:**
 - 2/14 without record entry or 3/28 for W.
- **LATE PAPERS**
 - Assignments are due at the beginning of the class period. If you forget to bring an assignment, you have 30 minutes after class in which to obtain it – otherwise the assignment is late. Late assignments are subject to a 10% penalty per day. Best advice = turn in work on time.
- **HONOR CODE**
 - All course work is to be done independently unless otherwise noted by Dr. Burks. Please write out and sign the honor pledge IN FULL on all assignments.

I have acted with honor and integrity in completing this work and am unaware of anyone who has not.

- If you are unclear on the concept of plagiarism or cannot sign the honor code in good faith, please see Dr. Burks. When in doubt, paraphrase and cite using Name and Year methods (Burks 2003). Any perceived impropriety will be discussed with the student and then the appropriate action pursued.



Why few arthropods are criminals

- **ACCOMMODATIONS**
 - Southwestern University will make reasonable accommodations for persons with documents disabilities. Students should provide documentation and schedule an appointment with the Academic Services Coordinator (x1286; Kimele Carter – 1st floor Protho) immediately.
- **EMAIL**
 - I will frequently e-mail to remind you of deadlines or to clarify points from a lecture. Please check your e-mail daily.
- **GROUP WORK**
 - All students are expected to contribute equally to group projects.
- **FOOD/DRINK**
 - I do not mind if we “snack” in class as long as it is not disruptive. No food or drinks are allowed in the laboratory

Tentative Lab Schedule:

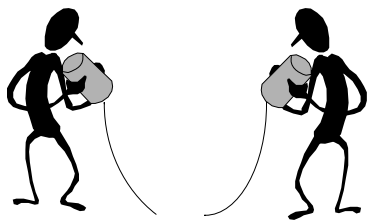
Week	Date	Lab #	Activity	Basic Description	Assignment Due	
1	1/11	1	Digital Photo Race	Experience inverts in daily life with photo scavenger hunt; Work in groups of 3-4; Everyone		
2	1/18	2	Phylogeny Lab	Learn process behind cladograms; candy represents potential invertebrate species; Burks & Boles (2007)	Digital Photos – <i>as a Picasa Album</i>	
3	1/25	3	Invertebrate Profile & Observation Lab	Observe various invertebrates using different techniques; Compare internal morphology on CD	Phylogeny Worksheet	
4	2/1		Outside 1: Collection in Freshwater Systems	Find invertebrates in odd places; Think about adaptations for aquatic inverts	Observation Worksheet Basis for Design an Ap:	
5	2/8	4	Dichotomous Key Lab	Build dichotomous key with all of collected invertebrates plus those supplied in lab		
6	2/15		Outside 2: Prepare & set out 1st set of Colonization Bricks	Demonstrate basic premise of Island Biogeography Examine abun/diversity at different sites & times	Dichotomous Worksheet	
7	2/22	5	Gummy Worm Diversity Lab	Calculate Shannon Weiner diversity indices		
8	3/1		<i>No official lab; Meet in Groups to start planning experiments; Volunteers go put out 2nd set of bricks (1 week versus 3 weeks of colonization)</i>			Worm Diversity Lab
9	3/8	6	Outside 3: Collect Bricks	Sort , Identify and Count , Accumulate data for analysis for Invert Statistical Lab		
10	3/15	Spring Break – no class				
11	3/22		<i>Open Working Lab: Compensation</i>	Designate time to work on statistics; Finalize group plans; Dr. Burks available for consultation	Group Proposal Due	
12	3/29		<i>No Lab: Compensation for Field Trip Time</i>		Invert Statistics Lab Due	
13	4/5	7	Execute Group Project	Use time/week to execute group experiment		
	4/8 -4/10		Major Field Trip: Marine to Port Aransas	Collect marine invertebrates: Depart Friday afternoon; return late Sunday		
14	4/12		Analysis and Writing Time	Set aside period for shared statistical analysis of group experiment and then time to write	Draft due Friday 4/15	
15	4/19		Culinary Applications Lab	Give group research PowerPoint presentations while we indulge in the culinary inverte world	Peer Reviews Due	
16	4/26		<i>No Lab: Compensation for Field Trip Time</i>		Final Papers Due	

Tentative Lecture Schedule: Tu/Th 12:50-2:05 p.m.; Chapter numbers refer to Pechenik 6th edition

WEEK	DATE	TOPIC	READINGS	NOTES	PP	DUE
1	1/11 Tu	Pre-test, Syllabus Review		Show Moodle Structure SCAVENGER HUNT LAB		
	1/13 Th	Evolution and Phylogeny	Chapter 2		<i>InvEvol</i>	Quiz 1 - Burks
2	1/18 Tu	Protozoa and Choanoflagellates	Ch 3 : 37-46 ; Carroll 2010 King et al. 2008	PHYLOGENY LAB - See: http://kinglab.berkeley.edu/ <i>Assign habitats</i>	<i>Origins</i>	Quiz 2 – Burks
	1/20 Th	Discussion Habitats : Each student brings abstract of paper that features invertebrate & habitat : 1. Internal ; 2. Aquatic ; 3. terrestrial aerial ; 4. terrestrial soil ; 5. Vegetation ; 6. Marine ; 7. Rocky intertidal				
3	1/25 Tu	Poriferans	Ch 4	PROFILE/OBSERVATION LAB	<i>Sponges</i>	Quiz 3 – Burks
	1/27 Th	Ecology of Sponges	Wulff et al. 2006 Ellison et al. 1996	Lead by Dr. Burks		
4	2/1 Tu	Cnidarians & Ctenophores	Chpts. 6-7	OUTSIDE LAB	<i>Cnidarians</i>	Quiz 4 – Group A
	2/3 Th	Lect. Continued. and group examination of Coral Bleaching Papers				
5	2/8 Tu	PL Reading	Riegl et al. 2009 + split up papers on Moodle DICHOTOMOUS KEY LAB		Cameron	
	2/10 Th	Discussion: Is coral bleaching adaptive: Each person in the class assumes a role				
6	2/15 Tu	Platyhelminthes & Lophophorates	Chpts. 8, 19	2/14= withdraw without a W; OUTSIDE 2	<i>Flatworms</i>	Quiz 5 – Group B
	2/17 Th	<i>Primary Literature Discussion 1</i>	TBD by group & posted on Moodle	1 st pair for topic related to flatworms		
7	2/22 Tu	Mollusks	Ch 12	WORM DIVERSITY LAB	<i>Mollusks</i>	Quiz 6 – Group C
	2/24 Th	No Class – Brown Symposium				
8	3/1 Tu	<i>Review Time</i>		GROUP TIME LAB		
	3/3 Th	<i>No Class – Comp Time; Dr. Burks at TAS</i>				
9	3/8 Tu	Annelids	Ch13	OUTSIDE 3	<i>Annelids</i>	Midterm Exam Quiz 7 – Group B
	3/10 Th	<i>Primary Literature Discussion 2</i>	TBD by group & posted on Moodle	2nd pair for topic related to annelids		
March 15th and March 17th = SPRING BREAK						

WEEK	DATE	TOPIC	READINGS	NOTES	PP	DUE
10	3/22 Tu	Nematodes	Ch. 16	OPEN LAB	Nematoda	Quiz 8 - Burks
	3/24 Th	<i>Primary Literature Discussion 3</i>	TBD by group & posted on Moodle			
11	3/29 Tu	Arthropods	Ch 14: 341-350	3/28 = last day to show W withdrawal; NO LAB	Arthropod1	
	3/31 Th	<i>Primary Literature Discussion 4</i>	TBD by group & posted on Moodle			
12	4/5 Tu	Arthropods: Chelicerates & Myriapoda	Ch 14: 350-360	EXECUTE GROUP EXPERIMENTS	Arthropod2	Quiz 9 – Group A
	4/7 Th	<i>Primary Literature Discussion 5</i>	TBD by group & posted on Moodle			
13	4/12 Tu	Arthropods: Insecta	Ch 14: 360-373	OPEN LAB	Arthropod3	Quiz 10– Group C
	4/14 Th	<i>Primary Literature Discussion 6</i>	TBD by group & posted on Moodle			
14	4/19 Tu	Arthropods: Crustaceans	Ch 14: 373-396	CULINARY LAB AND PP PRESENTATIONS	Arthropod4	
	4/21 Th	<i>Primary Literature Discussion 7</i>	TBD by Burks			
15	4/26 Tu	Echinoderms	Ch 20	NO LAB	Echinoderms	Quiz 11: Burks
	4/28 Th	Final Review				
FINAL available Friday 4/29 by noon			Final Due Seniors: 10 am Monday, 5/2; Others: 12 pm Friday 5/6			

Discussion topics could include, but are not limited to: Exotic Species, Predation, Competition, Disturbance, Nutrient Cycling, Global Climate Change, Disease Ecology, Mating Systems, Hybridization, Speciation, or Parasitism. **All Readings are either at the Library or on Sakai.**



Please fill out the syllabus check on Moodle that says that you have read to the syllabus and agree to its contents and the course expectations.