

# Invertebrate Zoology (BIO 440)

Lecturer: Stanton Belford, Ph.D.

Office Hours: M-F. 11 a.m.-12 noon

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Lecture: MWF 9 a.m.-9:50 a.m. (A105)

Twitter: @MMCBiology

Laboratory: Tues. 2-4:50 p.m. (A104)

## Teaching Philosophy

## *Explore, Discover, Empower*

I believe that students are explorers possessing prior knowledge from past experiences, seeking to add to an already existing foundation to what they know. Students learn in a variety of ways, and the skills and knowledge obtained are key facets to becoming a productive member of society. Students can learn in any environment, but environments that enhance their curiosity and interest, and related to their life are effectively adding to their growing knowledge. The teaching environment is one that emphasizes open-ended questions, which initiate student discussion, and emphasize learning for all levels of diverse learners.

My role as a science educator is to expand students' science literacy by increasing their skills and knowledge of the natural world around them. Students will gain a better sense of stewardship as their present and future behaviors toward the environment will have both direct and indirect effects on it. Ultimately, my goals focus on (a) determining the quantity and quality of students' prior knowledge (b) using science-inquiry to initiate student-centered discussion and problem-solving, and (c) increasing student interest in science by illustrating the importance of the scientific process in their lives and the environment around them.

## Course Objectives

The primary goal of this course is to instill a general awareness and appreciation for the diversity of aquatic and terrestrial invertebrates, which compose of over 95% of animal species on Earth. Lectures will be devoted primarily to a survey of all the invertebrate phyla, with emphasis on morphology, internal anatomy and physiology, systematics, evolution, and ecology. Lectures may or may not coincide with chapters in your textbook as there are many complex systems and processes that occur in organisms that are best explained using comparative anatomy and evolutionary history. Lecture PowerPoints are available to you online.

The laboratory will include "hands-on" examination of specimen from various phyla, dissections, and individual collections of invertebrates by students. Some labs will require us to go to the field to collect samples to bring back to the lab for further examination and identification. You also will collect physical water quality (chemical and biological) samples as this is an important aspect in monitoring the patterns of invertebrate diversity for each local habitat. Other samples can be identified using adequate field guides, which will add knowledge to monitoring invertebrate biodiversity.

Please keep in mind that there is no extra credit activity, study guides, reviews, etc. for this course. You are expected to perform as an upper level student on the cusp of attaining your undergraduate degree and in the process of preparing to enter a graduate program.

### Expected Learning Objectives

Students will be able to describe the fundamentals of the evolutionary processes that lead to the diversity of organisms, and to explain the phylogenetic relationships among the major taxa of organisms.

### Resources

**Lecture:** Ruppert, E.E., Fox, R.S., & Barnes, R.D. (2004). Invertebrate Zoology: A Functional Evolutionary Approach 7<sup>th</sup> edition. Thompson, Brooks/Cole, California.

(Optional) Brusca, R.C., Moore, W., and Shuster, S.M. (2016). Invertebrates. 3<sup>rd</sup> Edition. Sinauer Associates, Inc., Sunderland, Massachusetts.

**Lab (Optional):** Wallace, R.L., and W.K. Taylor. 2002. Invertebrate zoology, a laboratory manual, 6th edition. Prentice-Hall, Upper Saddle River, New Jersey.

**Grading:**

Lecture Knowledge Experience #1:	100 pts
Lecture Knowledge Experience #2:	100 pts
Lecture Knowledge Experience #3:	100 pts
Lecture Knowledge Experience #4:	100 pts
Lecture Knowledge Experience #5:	100 pts
Lecture Knowledge Experience final:	200 pts

### Laboratory:

Laboratory Midterm	100
Laboratory Final Exam	100
Invertebrate Collection	50
Lab Notebook	50

**Note:** Scores made on your lecture knowledge experiences (1-5) and your final will count as **70%** of your overall course grade. Your lab grade will count as **30%**.

**Grade Scale** (Knowledge Experience)  
(Lecture+Lab)

**Overall Course Grade Scale**

A (≥ 90)	A = 900 - 1000 points
B (≥80-89)	B = 800 - 899 points
C (≥70-79)	C = 700 - 799 points
D (≥60-69)	D = 600 - 699 points
F (Below 60)	F = < 600 points

**Attendance:** It has been scientifically shown that the more classes you attend, the higher your grade. See the policy on attendance set forth in the College Catalog.

You are expected to attend all lectures and labs, and to perform all the assigned work. PowerPoint presentations and chapter guides will be available online (see website), and you will be responsible for getting notes from a classmate if you miss class. A significant proportion of the assessment material will not be exclusively evident from the PowerPoint presentations, so attendance and quality note-taking are important (do not simply copy the words on the PowerPoint – you can review that later).

You must have a legitimate College excuse if you are absent on the day of scheduled knowledge experience or lab quizzes/exams. Should you have to make-up any assessment, the instructor has the right to determine if you can or not. Once you have fulfilled the aforementioned criteria, you have a **week** to make-up, or choose the scheduled make-up date (see below). You cannot leave class on an exam day simply because you forgot to study for it, or you overslept. All final exam days are scheduled by the Academic Affairs office, therefore if you miss your final exam, or have to take it on another day; you **MUST** get permission by the aforementioned office, prior to arranging a make-up exam. Should you have to make-up any assessment, the instructor has the right to determine if you can or not.

**Academic Misconduct:** Academic misconduct is a violation of the College's Academic Honor Code.

**Finding Out Your Grades:** Every effort will be made to grade exams and assignments in a timely fashion. Grades will be delivered to you during class, otherwise make an appointment to see me before or after class. You must also meet with me if you wish to appeal a grade, including the final course grade. **Due to the Federal Family Rights and Privacy Act, (FERPA), I will not discuss grades via e-mail, telephone, or social media.**

**Responsibilities:** This syllabus is your guide to know what is taking place in class each week, so **Print It!** It is imperative that you come to class to expand your scientific knowledge, because your textbook is only one resource that you will use to prepare yourself for the various concepts that will be introduced in class. There will be a lot of discussions during each class. Your questions are welcomed!

**Students With Disabilities:** Any student who feels she/he may need an accommodation based on the impact of a disability should contact the Provost's Office immediately to report their disability and qualify to receive accommodations from your professors. Once you have done this,

you may meet privately with me, to discuss your specific needs. Although you may report your disability at any time, please attempt to make arrangements within the first two weeks of the semester so all appropriate academic accommodations can be arranged for you. It is important that you do this as soon as possible because accommodations are not retroactive and any grade you make prior to such notification will stand. For additional information, contact the Provost's office.

**Please be respectful and turn-off/silence all smart devices.**

### Tentative Course Calendar Spring

Week	Lecture Topic	Reading	Lab Topic
<b>January 10-12</b>	Course Expectations Introduction to Invertebrates/ Classification	Chapters 1	No Lab
<b>January 15</b>	<b>Holiday</b>		
17-19	Introduction to the Protozoa	Chapters 2 and 3	Lab1: Use of Microscope; Protozoa
22-24	Introduction to the Metazoa, Porifera and Placozoa	Chapter 4 and 5	Lab2: Protozoa
<b>26</b>	<b>Knowledge Experience I</b>	<b>Chapters 1-5</b>	
<b>29-Feb. 2</b>	Cnidaria	Chapter 7	Lab3: Porifera, Ctenophora, Cnidaria
5-9	Cnidaria Ctenophora	Chapter 7 Chapter 8	Lab4: Porifera, Ctenophora, Cnidaria
12-14	Platyhelminthes	Chapter 10	Lab5: Annelida
<b>16</b>	<b>Knowledge Experience II</b>	<b>Chapters 7, 8, 10</b>	
19-23	Nemertea	Chapter 11	Lab6: Mollusca morphology and dissection
<b>26-March 2</b>	Annelida Mollusca	Chapter 13 Chapter 12	Lab practical Mid- Term Review
5	Mollusca	Chapter 12	<b>March 6: Mid-Term Lab Practical 1-6</b>
<b>7</b>	<b>Knowledge Experience III</b>	<b>Chapters 11, 12, 13</b>	
<b>9</b>	<b>Study Day</b>		
<b>12-16</b>	<b>Spring Break</b>		No Lab
19-23	Onychophora	Chapter 15	Lab7: Mollusca survey

	Tardigrada		(lab)
26-28	Arthropoda	Chapter 16	Lab8: Mollusca survey (field)
<b>30</b>	<b>Holiday</b>		
<b>April 2-4</b>	Arthropoda	Chapter 16	Lab9: Arthropoda survey (field)
<b>6</b>	<b>Knowledge Experience IV</b>	<b>Chapters 15, 16</b>	
9-13	Chelicerata and Crustacea	Chapters 18 and 19	Lab10: Echinoderm dissection and survey
16-18	Chelicerata and Crustacea	Chapters 18 and 19	Lab practical Finals Review
<b>20</b>	<b>Knowledge Experience V</b>	<b>Chapters 18, 19</b>	
23-25	Lophophorata and Echinodermata	Chapters 25 and 27	<b>April 24: Final Lab Practical 7-10</b>
<b>27</b>	<b>Make-up</b>		
<b>30</b>	<b>Reading Day</b>		
<b>May 2</b>	<b>Final (8-10 a.m.)</b>	<b>Comprehensive</b>	