

# Invertebrate Zoology – ZOOL 3104

Spring 2016

**Instructor:** Dr. Matthew Bolek, 415 Life Sciences West, 744-9675  
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Office hours: MW 9:30-10:15 (subject to change), or by appointment

**Lecture:** CLB 207, MWF, 8:30 – 9:20

**Laboratory:** LSW 316

Section 001	T 6:30-9:20
Section 002	W 1:30-4:20
Section 003	R 1:30-4:20
Section 004	F 1:30-4:20

**Laboratory Instructors:** Christina Williams, 403 Life Sciences West, 744-5555  
E-mail: [christina.williams10@okstate.edu](mailto:christina.williams10@okstate.edu); Sections 001; 003  
Jeremy Kaplan, 509B Life Sciences West, 744-555  
E-mail: [jdkapla@ostatemail.okstate.edu](mailto:jdkapla@ostatemail.okstate.edu) Sections 002; 004

**\*\*Questions concerning the laboratory should be directed to your TA.\*\***

## Texts:

Brusca, R. C. and G. J. Brusca. 2003. Invertebrates (2<sup>nd</sup> Edition). Sinauer Associates, Inc., Sunderland, MA.

Gould, S. J. 1989. Wonderful Life. The Burgess Shale and the Nature of History. Norton books.

**Course Description:** Invertebrates comprise the vast majority of living animals and protozoa. The main objective of this course is for students to gain an understanding of the basic structure, function, life history, and ecology of major invertebrate groups and to identify important evolutionary trends in invertebrate zoology. AKA we will live, breath and act like invertebrate zoologists!

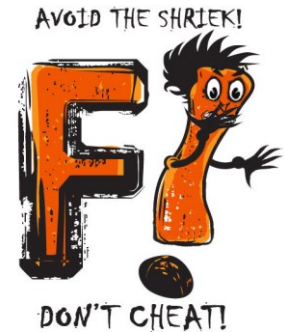
**Website:** [www.matthewbolek.com](http://www.matthewbolek.com); go under teaching, and Invertebrate Zoology.

**Approach:** “The invertebrates” include about 40 phyla, each (presumably) distinguished by a different “basic body plan” while the more familiar vertebrates are all in a single subphylum. Obviously we will not have enough time to cover all of these groups, and however we will try to cover the more common groups of invertebrates along with some very intriguing and obscure groups. This course will therefore be a survey of protozoa and invertebrate animals, emphasizing the similarities and differences in how invertebrates approach the challenges of life. The overall goal of this course is for students to become aware and knowledgeable about the diversity of invertebrates (both local and global). Therefore, you will learn a massive vocabulary list throughout the semester which will allow you to identify and appreciate the different invertebrate groups and the massive amount of literature on the invertebrates that is generated each year.

**Prerequisites:** Animal Biology (ZOOL 1604)

**Attendance:** You are expected to attend all classes and labs. **There are no make-up labs.**

**Academic Integrity Policy:** Oklahoma State University is committed to maintaining the highest standards of integrity and ethics. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, multiple submissions, cheating on examinations, fabricating information, helping another person cheat, unauthorized advance access to examinations, altering or destroying the work of others, fraudulently altering academic records, and similar behaviors) will result in a sanction. Sanctions include: receiving a failing grade on an assignment, examination or in the course, receiving a notation of a violation of academic integrity (F!) on your transcript, and being suspended from the University. You have the right to appeal the charge. Additional information is available from the Office of Academic Affairs, 101 Whitehurst, 744-5627, <http://academicintegrity.okstate.edu/>. Familiarize yourself with the new OSU policy on Academic Integrity (available online at: <https://stw.sp.okstate.edu/policies/Shared%20Documents/Academic%20Integrity.pdf>).



**Special Accommodations:** If you have a disability and need special accommodations, the instructor will work with you and the Office of Student Disability Services, 315 Student Union, to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class. Please advise the instructor of such disability and the desired accommodations as soon as possible, preferably before or immediately after the first scheduled class. You **must** have an official letter from Student Disability Services indicating what constitutes appropriate accommodations. If alternative testing is required, notify the instructor **at least four days prior** to each examination.

**Grading\*:**

Lecture

Exams: 3 (100 pts each)	300 pts
In-class Quizzes: at least 10 (10 pts each)	100
Gould Critical Thinking/Writing Assignment: 5 (15 pts each)	75
Favorite Burgess Shale Animal Review Paper	
-Choice of Animal	10
-Annotated Bibliography	25
-Term Paper	90
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Lecture subtotal	600 (60%)

## Laboratory

Lab quizzes (10 @ 10 pts each)	100 pts
Lab Notebook (2 @ 25 pts each)	50
Hairworm experiment (1 @ 25)	25
Hairworm Lab Report	25
Kelp Holdfast Presentation	25
Kelp Holdfast Presentation Discussion	25
Lab Midterm Exam	60
<u>Lab Final Exam</u>	<u>90</u>
Lab subtotal	400 (40%)

**Total** **1000 pts**

**Final Grade:** 90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, below 60%=F.

**\*If you are taking this course for graduate credit, please see the instructor to discuss additional assignments and the grading scale for graduate credit.**

**Exams:** There will be three exams in the course. Each exam will cover material from lectures, assigned readings and labs, with an emphasis placed on material presented in lecture. All exams will emphasize material presented since the last exam.

**\*\*Points will be deducted for incorrect grammar and spelling. If you want full credit, you must use correct grammar and spelling.\*\***

**Makeup exams** require **advance notice and outside verification**. Notification of a missed exam must be made **within twenty-four hours** of the missed exam. If you fail to notify your instructor that you missed an exam, you will be given a score of zero on that exam. Acceptable reasons for missing an exam include confining illness, death in the family, etc. The makeup exam **must be taken within one week** after the return to class and will be provided in a **different format** than the in-class exam (see the instructor for details). Exams missed without an excused absence will receive a grade of zero.

**Conflicts with Other University Activities:** If you know that you are going to miss an exam due to an official university-sponsored activity or military training you may be able to take an early exam. Early exams may be in a **different format** than the in-class exam (see your instructor for details) and any conflicts must be resolved **at least one week prior** to the conflict.

**In-class Quizzes:** Each week on Friday we will have a 10 point quiz on material presented during the week. I plan on having at least 12 weekly quizzes. Your two lowest quizzes will be dropped.

**Gould Critical Thinking/Writing Assignments:** These assignments consists of a take-home single spaced typed page (one inch margins, 12 point font; 500 words) review/discussion for each of five specific chapters in "Wonderful Life: The Burgess Shale and the Nature of History". Specific information on each chapter will be provided a week before each chapter review/discussion is due (see topics in syllabus). The overall goal of these reviews is to familiarize yourself with the

fossil invertebrates of the Burgess Shale and critically think/discuss specific topics for each chapter, which will hopefully help you, develop ideas for your final term paper on your choice of a Burgess Shale invertebrate (see below).

**Favorite Burgess Shale Animal Review Paper:** I expect you to write a paper reviewing your favorite Burgess of Shale Invertebrate. The grading for this paper assignment will consist of three parts.

- (1) **Choice of Topic (10 pts):** You will write a single spaced (1 inch margins, 12 point font) page indicating what invertebrate you picked, why you picked this invertebrate and what you would like to write your paper on.
- (2) **Annotated Bibliography (25 pts):** The annotated bibliography will include 5 relevant papers from the peer-reviewed literature for your chosen BS invertebrate. The annotated bibliography will consist of the formatted citation for each paper, followed by 3-5 sentences that summarize the main points of each paper, and 2-3 sentences about what you think about each paper (i.e., what did you like and/or not like about the paper, was there something you found difficult to understand, etc.). The annotated bibliography is due on the date listed on the lecture schedule. Late assignments will be penalized one letter grade for each 24-hour period late.
- (3) **Final Paper (90 pts):** The paper will consist of an updated review of your favorite Burgess Shale Invertebrate. The term paper should consist of an introduction, question or topic addressed, and review of the topic. The paper should include at least 5 relevant papers from peer-review literature which hopefully you will provide in your Annotated Bibliography (see 2 above). The paper should be double spaced and no more than 10 pages (double spaced, 1 inch margins and 12 point font) not including the bibliography.

**Extra Credit Opportunity:** You may visit the Oklahoma Aquarium in Jenks, OK (see <http://www.okaquarium.org/> for details and admission prices) and submit a receipt/ticket stub dated 2014 and a ½ page typed summary about an exhibit of your choice related to what you have learned in class or expect to learn for groups yet to be covered (so anything related to invertebrate structure, function, life history or ecology). You may earn up to **FIVE** points of extra credit based on the quality of your submitted summary. **All extra credit activities must be submitted by April 29, 2016.**

**Corrections on exams and assignments for lecture and lab must be requested within one week of the day the grade was returned in class.**

**Cell Phone Policy:** The use of cell phones is prohibited during class, including texting, internet, e-mail, etc. Cell phones must be turned off or put on silent (vibrate) during class. If you choose to use your cell phone, leave the classroom to do so. If you think you qualify for an exception to this policy (e.g., you are experiencing a family emergency), please notify the instructor before class. The use of cell phones and other electronic devices during exams will be considered a violation of the Academic Integrity Policy unless you receive prior approval from the instructor.

**\*\*Please see the OSU syllabus attachment on the online classroom site for this course for frequently asked questions related to courses at OSU. \*\***

LECTURE SCHEDULE – ZOOL 3104 \*\*Subject to Change\*\*

Date		Day	Topic	Reading Assignment
Jan	11	M	Introduction to the Burgess Shale	Ch. 1
Jan	13	W	Animal Structure	Ch. 3
Jan	15	F	Animal Structure	Ch. 3
<i>Kingdom Protista</i>				
<b>Jan</b>	<b>18</b>	<b>M</b>	<b>MLK DAY, NO CLASS</b>	
Jan	20	W	Protists	Ch. 5
Jan	22	F	Protists	Ch. 5
<i>Kingdom Animalia</i>				
Jan	25	M	Porifera	Ch. 6
<b>Jan</b>	<b>27</b>	<b>W</b>	<b>Porifera; Gould Ch. 1 Review Due</b>	Ch. 6
<i>Metazoa – Radiata – Diploblasts</i>				
Jan	29	F	Placozoa and others	Chs. 7
Feb	1	M	Placozoa and others; Cnidaria	Chs. 7 & 8
Feb	3	W	Cnidaria	Ch. 8
Feb	5	F	Cnidaria; Ctenophora	Chs. 8 & 9
<b>Feb</b>	<b>8</b>	<b>M</b>	<b>Test I</b>	
<i>Eumetazoa – Triploblastic Bilateria – Lophotrochozoa</i>				
Feb	10	W	Platyhelminthes	Ch. 10
<b>Feb</b>	<b>12</b>	<b>F</b>	<b>Platyhelminthes; Gould Ch. 2 Review Due</b>	Ch. 10
Feb	15	M	Gastrotricha, Gnathostomulida	Ch. 12
Feb	17	W	Rotifera, Acanthocephala	Ch. 12
Feb	19	F	Entoprocta, Ectoprocta, Brachiopoda	Chs. 12 & 21
Feb	22	M	Nemertea; Mollusca	Chs. 11 & 20
Feb	24	W	Mollusca	Ch. 20
<b>Feb</b>	<b>26</b>	<b>F</b>	<b>Mollusca; Gould Ch. 3 Review Due</b>	Ch. 20
Feb	29	M	Annelida	Ch. 13
Mar	2	W	Annelida	Ch. 13
Mar	4	F	Annelida; Sipuncula and Echiura; Gould Ch.	Chs. 13 & 14
<b>Mar</b>	<b>7</b>	<b>M</b>	<b>Test II</b>	
<i>Eumetazoa – Triploblastic Bilateria – Ecdysozoa</i>				
Mar	9	W	Nematoda	Ch. 12
Mar	11	F	Nematomorpha; Gould Ch. 4 Review Due	Ch. 12
<b>Mar</b>	<b>14-18</b>	<b>M-F</b>	<b>SPRING BREAK, NO CLASS</b>	
Mar	21	M	Kinorhyncha; Priapulida; Loricifera	Ch. 12
Mar	23	W	Onychophora, Tardigrada	Ch. 15
<b>Mar</b>	<b>25</b>	<b>F</b>	<b>Trilobitomorpha; Gould Ch. 5 Review Due</b>	Ch. 15
Mar	28	M	Arthropoda: Hexapoda	Ch. 17
Mar	30	W	Arthropoda: Hexapoda	Ch. 17
<b>Apr</b>	<b>1</b>	<b>F</b>	<b>Arthropoda: Myriapoda; Topic BS Invertebrate Due</b>	Ch. 18
Apr	4	M	Arthropoda: Cheliceriformes	Ch. 19

Apr	6	W	Arthropoda: Cheliceriformes	Ch. 19
Apr	8	F	Arthropoda: Crustacea	Ch. 16
Apr	11	M	Arthropoda: Crustacea	Ch. 16
<i>Eumetazoa – Triploblastic Bilateria – Deuterostomia</i>				
Apr	13	W	Chaetognatha	Ch. 23
<b>Apr</b>	<b>15</b>	<b>F</b>	<b>Echinodermata; Annotated Bibliography Due</b>	Ch. 22
Apr	18	M	Echinodermata	Ch. 22
Apr	20	W	Echinodermata	Ch. 22
Apr	22	F	Hemichordata	Ch. 23
Apr	25	M	Chordata	Ch. 23
Apr	27	W	Invertebrate Phylogeny	Ch. 24
<b>Apr</b>	<b>29</b>	<b>F</b>	<b>Invertebrate Phylogeny; Paper BS Invertebrate Due</b>	Ch. 24
<b>May</b>	2-6	<b>W</b>	<b>FINAL EXAM WEEK</b>	