

# Vertebrate Design and Evolution – Biology (BIOE) 403

## Lecture Syllabus

Biology 403

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Fall 2018, TR 11:00-12:20, HS 114

Office Hours: T 9-11, W 9-10 & by appointment; Health Sciences 208

Course Handouts: <http://umonline.umt.edu>

Date	Topic	Reading
Aug. 28, <b>30</b>	Chordate Origins, Evolutionary Hypotheses, Phylogeny ( <i>Lecture assignment #1: Phylogenetics Website, Garland and Adolph, 1994</i> ) <b>No Lecture Thursday (there is lab in afternoon)</b>	Ch 1, 2, 3
Sep. 4,6	Phylogeny continued ( <i>Lecture Assignment #2</i> )	Ch 4
Sep. 11,13	Scaling: Ontogeny and Macroevolutionary Patterns	Ch 5
Sep. 17, 20	Skeletal anatomy; Mechanical Design, Form and Function	Ch 7, 8, 9
Sep. 25, 27	<b>Exam I (50 pts)</b> , Skeletal Function	Ch 4
Oct. 2, 4	Muscular anatomy; comparative form and function	Ch 10
Oct. 9, 11	No Class Tuesday, Muscle form and function cont.;	Ch 11
Oct. 16, 18	Comparative locomotion	Ch 11
Oct. 23, 25	Vertebrate nervous system: Coordination and integration	Ch 13, 14
Oct. 30, Nov. 1	Circulation and Respiration	Ch 18, 19
Nov. 6, 8	<b>No Class Tuesday</b> (Election Day), Circ. & Resp. Cont.	Ch 18, 19
Nov. 13, 15	Feeding and Digestion	Ch 16, 17
Nov. 20, 22	<b>Exam #2 (50 points) No Class Thursday (Thanksgiving)</b>	
Nov. 27, 28	Digestion`	
Dec. 4, 6	Osmoregulation	Ch 20
Dec 14	<b>Final Exam (100 points, comprehensive; 10:10-12:10, Friday)</b>	

**Textbook: Liem, Bemis, Walker, & Grange.**

*Functional Anatomy of the Vertebrates: An Evolutionary Perspective, 3rd Edition*

**Course Policy:**

Biology 403 is a 5 credit hour course and requires substantial amount of time and effort. Through the course, you will come to view the biological world through a new pair of eyes, and you will be better prepared for entrance into the work force and/or graduate school. Biology 403 integrates much of your undergraduate education, drawing from: evolutionary biology, physics, math, general biology, animal behavior, developmental biology, and introduces aspects of geologic history. If you maintain a positive attitude and a professional demeanor throughout the semester, you will do very well.

**Grading:** Your final course grade is determined from your balanced performance in both lab and lecture. In other words, lab and lecture grades are combined and equally weighted to determine your final grade.

**Student project:** Each student will be involved in a group (3-5 students) experiment executed on a Friday with the instructors. A separate handout will outline expectations or oral and written presentations.

**Writing:** Biology 403 is considered a “W” (writing) course. As such, you will hand in several assignments that will be edited, corrected, and commented on by both instructors. You will be expected to submit a revision of your work to receive a grade on each assignment.

**Reading:** Students are expected to read and re-read assigned material at least 8-10 hours per week. Postponing your daily reading will simply result in needless pre-test anxiety. Students are expected to faithfully attend and come prepared to both lecture and lab. In conclusion, attending class with a “can-do-attitude” will account for the vast majority (perhaps 80%) of your success in this course. Stick with us and we promise you’ll learn a wealth of information that will be useful to you throughout your career.

**Grading:** Your final course grade is determined from your balanced performance in both lab and lecture. In other words, lab and lecture grades are combined and equally weighted to determine your final grade.

Lecture Exam #1	50 pts
Lecture Exam #2	50 pts (comprehensive)
Final Exam	100 pts (comprehensive)
Total Lecture Exam Points	200
Total Lab Points	200 (see lab syllabus)
Writing Points	100
Assignment 2	10 pts (Lecture)
Project Proposal	20 pts (Lab)
Project, Final Paper	70 pts (Lab)
Total Points	500

**Learning Outcomes**

1. Students will be able to discuss and write syntheses of the major themes in the evolution of vertebrate form and function.
2. Students will be able to graph, problem-solve, and interpret figures describing patterns and processes in functional morphology, comparative biomechanics and physiology.
3. Students will be able to conduct all aspects of an original, guided research project within a small group, with products including a research paper and a public presentation both summarizing the experiment and results.
4. Students will be able to identify anatomical traits and functions in all chordates.
5. Students will be able to dissect and identify anatomical traits and functions in a representative mammal specimen.

**Course and University Policy:**

*All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and /or a disciplinary sanction by the University*

*All students need to be familiar with the [Student Conduct Code](#).*

The University of Montana provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the [Disability Services for Students](#) at 243-2243. This document has been fixed with heading structure and self-describing links for use with screen readers.

## **Biology (BIOE) 403: Vertebrate Design and Evolution Fall 2018 Lab Syllabus**

Thursday and Friday 2:00-4:50 pm

Tony Lapsansky  
anthony.lapsansky@umontana.edu  
Office Hours will be during open lab and by appointment.

**Location:** Thursdays - HS102, Fridays - HS204 **OR** Field Research Station at Fort Missoula (2960 Post Siding Road, Missoula, MT 59804)

**Text:** Homberger and Walker, *Vertebrate Dissection*

There are also numerous websites, alternate dissection guides, and study guides that may help in the study of comparative anatomy.

**Lab handouts will be available on moodle in advance of lab** at <http://umonline.umn.edu>

It is your responsibility to print out handouts and finish the reading and any pre-lab work *prior* to coming to the lab.

**Experiment Days:** Sessions at the Field Research Station will provide time in an active biomechanics and functional anatomy lab for **group research projects** on novel scientific questions. Thus, the exact time and dates that you will be required to attend will depend on your project. Project assignments will be made in the first two weeks. At the end of the semester, you will write your own scientific manuscript, and perform a professional group presentation of the results of your research. Times of meetings will be announced; due dates are on the attached handout.

**Homework/Quizzes:** Most labs (10 labs total) will start with a quiz (2.5 pts each) and have an associated lab handout (Lab) to be completed during/after lab (2.5 pts each). The point values are small, but the purpose of these is to keep you invested in the lab throughout the semester. Quizzes will provide examples of the types of questions on the **practical exams**. Lab handouts are due immediately at the start of lab; quizzes will begin shortly thereafter.

**Late Policy:** It is your responsibility to get to lab on time. **If you are more than 1 minute late, you will forfeit the day's lab handout and quiz points.** This is my only way of ensuring that you arrive on time, ready for lab.

**Exams** will consist of practical questions about structures, functions, evolutionary trajectories, and comparisons of anatomy. **There will be *no* makeup quizzes or exams, period.**

**Lab Points:**

Quizzes, Homework	50
1st lab practical	50
2nd lab practical	50
Group project	50
Participation/Preparation (20 pts)	
Group Evaluation (10 pts)	
Group Presentation (20 pts)	
	200 points

**Academic Honesty:** Please do not cheat or plagiarize (“the practice of taking someone else's work or ideas and passing them off as one's own”). In a small course, it’s painfully obvious when academic dishonesty has occurred. This will result in an automatic zero on the assignment and I will have to report it to the university. It’s no fun for anyone, so please don’t do it.

Schedule (subject to revision): Readings refer to Homberger and Walker, *Vertebrate Dissection*

Month	Date	Related pp.	Assignment Due	Location	Lab
August	30	pp. xv-xvi		HS102	Introduction, Lang. of Anatomy
	31	pp. 1-13	Quiz #1	HS204	Lab 0a: Phylogenetic Analysis
September	6		Quiz #2	HS102	Lab 0b: Phylogenetic Analysis
	7			Fort	Biomechanics Lab Tour
	13		Lab 0	Fort	Initial Group Meetings, All Groups
	14	pp. 85-91, 103-114		HS204	Lab 1a: Intro to chordates; post-cranial skeleton of the cat
	20	pp. 80-85, 92-102	Quiz #3	HS102	Lab 1b: Comparative post-cranial skeleton
	21	pp. 38-79	Lab 1	HS204	Lab 2: Cranial skeleton and comparative skulls: evolution of the inner ear
	27	pp. 144-183	Lab 2, Quiz #4, First Draft of Proposal (Intro)	HS102	Lab 3: Muscle Dissection: axial, proximal-appendicular of the cat
	28	pp. 144-183	Lab 3, Quiz #5	HS204	Lab 4: Muscle Dissection: Distal forelimb and cranial of the cat
October	4	pp. 115-143	Lab 4, Quiz #6	HS102	Lab 5: Comparative Muscle Dissections
	5			Fort	Group 1: Experiment 1
	11		Lab 5	Fort	Group 2: Experiment 1
	12			HS204	<b>Practical Exam I</b>
	18				Open Lab, Writing
	19	pp. 249-289	Quiz #7, Final Draft of Proposal Due (Intro and Methods)	HS204	Lab 6: Respiration, Vocalization, Digestion
	25	pp. 206-243	Lab 6, Quiz #8	HS102	Lab 7: Nervous System, Brain, Eye
26			Fort	Group 1: Experiment 2	
November	1	pp. 290-345	Lab 7, Quiz #9	HS102	Lab 8: Circulatory System I: the heart, arteries, and veins
	2			Fort	Group 2: Experiment 2
	8	pp. 290-345	Lab 8, Quiz #10	HS102	Lab 9: Circulatory System II
	9				Open Lab, Study
	15		Lab 9	HS102	<b>Practical Exam II</b>
	16				Open Lab, Experiment or Analysis Time
	29				Open Lab, Experiment or Analysis Time
	30				Open Lab, Experiment or Analysis Time
December	6				Presentation Preparation
	7		<b>Presentation</b>	Fort	<b>Symposium at Field Station</b>
	13		<b>Final Paper Due</b>	HS102	

## **BIOE 403 Research Projects**

**Initial meetings:** Each group will meet at the designated times to discuss the rationale behind the project. Literature will be distributed at this time to aid in a more detailed literature search in preparation for writing the proposals.

**Proposals:** Must be submitted by 5pm on the date specified. They must be submitted electronically (as a MS Word attachment) via email. Receipt will be confirmed by email. Editing suggestions will be made, and the rewrites will be due before starting the experiment. No late proposals will be accepted. **Each person must write their own proposal.**

**Experiments:** All group members are required to attend all parts of the experiment. Some may have both morning and afternoon times. The total amount of time for the experiment will be at least five hours.

**Manuscripts:** Must be submitted by 5pm on December 13th. They must be submitted electronically (as a MS Word attachment) via email. Receipt will be confirmed by email. Format should follow the *Journal of Experimental Biology* (<http://jeb.biologists.org>). No late manuscripts will be accepted. Each person must write their own manuscript.

**Presentations:** There is a 20 minute slot for each presentation. Please allow 5 minutes for a question-and-answer session within that slot. Presentations must be made using MS Powerpoint and brought to the session (Field Station) to upload to the presentation computer at least 15 minutes before the start of the session. All group members should play equal parts in the presentation. Details on format for proposals, manuscripts, and presentations will follow.