

## Zoology 250 - Animal Anatomy and Physiology

Lectures: MWF (1:30-2:20, 50 minutes), Bostian 3712

Laboratory: 1 per week (3 hours)

Credit hours: 4

Prerequisites: ZO 150 & ZO 160 or BIO 181 & ZO 150

Web-site: [www.cals.ncsu.edu/course/zo250/zo250.htm](http://www.cals.ncsu.edu/course/zo250/zo250.htm) (note that there is no "l" here)

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Office hours: Tuesday and Thursday from 2:30-3:30.

Please note: if these times do not work, please contact me to make an appointment.

**Course Description:** This course will use a problem-based approach in focusing on fundamental principles of animal function. These principles will be illustrated by selected examples from both vertebrates and invertebrates. Emphases will be on biotic and abiotic environmental challenges to animal functioning, how animal structure and function are adapted to the physical and chemical laws that govern the rest of the world, and the way in which the solutions animals "arrive at" reflect both evolutionary adaptation and phylogenetic influences.

The laboratory portion of the course will be more "hands-on". This will involve some inspection/dissection of specimens, but primarily be based on physiologically-based "wet" and computer labs demonstrating animal function.

### General Lecture Topics

*Symmetry, Form and Life Style:* Why are most motile animals bilaterally symmetrical?  
What determines animal size?

*Support and Movement:* The generation of muscular force; Skeletal types; Locomotion;  
Other skeletal functions - mineral storage, protection, blood formation

*Animal Nutrition:* Physical and chemical packaging of nutrients; Digestive processes;  
Absorption: roles of surface area and diffusion; feeding adaptations

*Gas Exchange:* Physical and chemical constraints on gas exchange; Respiratory pigments; Water and ion loss in gas exchange; Becoming terrestrial

*Internal Transport: Open vs. Closed systems* - phylogenetic distribution & attributes of each. Vertebrate Circulatory Systems; The lymphatic system

*Immunity:* The need for an immune system and the components of this, the generation of immunity, HIV and AIDS

*Regulation of internal body fluids and homeostasis:* Homeostasis: Osmoregulation; Nitrogenous wastes; Thermoregulation-ectothermy, endothermy, and mixtures of the two

*Reproduction:* Sex determination and development; The regulation of reproduction; Sex hormone effects on the brain and behavior

*Endocrine systems and hormonal integration:* Why an Endocrine System?

Endocrine Glands and Hormones in Invertebrates and Vertebrates; Master glands; Hormone Receptors and signal transduction; Regulation of hormonal secretion and actions

*Nervous systems and neural integration:* Why a nervous system?; Excitable cells and ion channels; Signal propagation in neurons; Neuron communication; Neuromotor systems; Neural Systems and Behavior

*Receptors and Sense Organs:* Sensory transduction; Sensory modalities; Intensity coding; Mechanoreception/Hearing; Photoreception; Chemoreception, Electroreception

**Grading:** Grades will be on the ABCDF scale with +/- grades. The letter grade will be based on in-class exams, and a comprehensive final exam for the lecture portion of the course (75% of total course grade, individual components listed below) and on quizzes and reports for the laboratory portion of the course (6.25% for quizzes, 13.75% for written reports, 2.5% for oral presentation of a project proposal and the results of your project, and 2.5% for participation, clean-up, completion of worksheets for a lab subtotal of 25% of the course grade). In-class exams will consist of a variety of types of questions drawn from material covered since the previous exam (see syllabus) while the final exam will be comprehensive.

Letter Grades for this course will be assigned according to the scale below:

A- : 89.5-92.5%	A : 92.6-97.0%	A+ : 97.1-100%
B- : 79.5-82.5%	B : 82.6-86.4%	B+ : 86.5-89.4%
C- : 69.5-72.5%	C : 72.6-76.4%	C+ : 76.5-79.4%
D- : 54.5-59.5%	D : 59.6-64.5%	D+ : 64.6-69.4%
F : below 54.5%		

Important Note: These grade cutoffs may be lowered, but will not be raised.

**Calculation of Final Grade**

<u>Component</u>	<u>% of total</u>
Lecture Grade:	
Lecture Exams: best 3 of 4 at 16.67% each*	50
Final Exam*	25
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Lecture Subtotal	75
Lab Grade:	
Quizzes (best 5 of 6)	6.25
Written Reports and Lab practical	13.75
oral presentations	2.5
participation	2.5
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Lab Subtotal	25
Total:	100%

\* note that these four are the three in-class exams during the semester and the fourth mid-term exam that will be based on the last quarter of the material. This fourth mid-term exam will be given during the final exam period along with the final (this sounds challenging from a time allowed' perspective, but has not proven to be a problem in previous semesters – students have had plenty of time to finish).

**Calculation of lecture portion of grade:** The lecture portion of your grade will be determined as follows. There will be three in-class exams worth 16.67% each during the

course of the semester. The final exam will be a split: part of the credit will be based on material covered since the last in-class exam and the other part will be comprehensive and cover the whole semester. We will take the best three grades from your in-class exams and the non-comprehensive portion of your final (i.e., the portion covering material since the last lecture exam) for the final grade calculation. Since these are worth 16.67% each, these exams therefore are worth a total of 50% of your course grade ( $3 \times 16.67 = 50$ ). The comprehensive portion of the final exam will be worth 25% of your final course grade. The comprehensive portion of the final exam will be used for all grade calculations.

**Policy on Attendance:** Students are expected to attend both the lecture and their scheduled laboratory. Borderline grading cases will be affected by attendance in lecture: students with one or no unexcused absences will be assigned the next highest grade if they are within two percentage points of the cutoff point (e.g., a 'B-' would become a 'B' if within 2% of the grade cutoff). Students with two or more unexcused absences will not be given this increase. Students missing either lecture exams or laboratory exercises and quizzes will receive no credit for these exercises. Opportunities to make up lecture exams will be allowed only if students can provide a university-sanctioned excuse and supporting documentation. Any make up exams will be in primarily or completely essay format. Laboratory quiz and exercise grades will be "pro-rated" (i.e., the average calculated based on the other quizzes/exercises) **if and only if** a university sanctioned excuse for missing the quiz or exercise is provided. If no legal excuse is provided, a grade of zero will be given for the quiz/exercise and used in the final grade calculation.

**Policy on Academic Integrity:** Please refer to the University's policy on academic integrity for information regarding expectations of honesty and academic integrity in this and other courses. Students are expected to adhere to the NCSU student Honor Pledge and a student's signature on a test or assignment will be taken as an acknowledgement that they have done so. The integrity policy and honor pledge can be found at: [http://www.ncsu.edu/provost/academic\\_policies/integrity/reg.htm](http://www.ncsu.edu/provost/academic_policies/integrity/reg.htm). This policy is also described in the NCSU undergraduate catalog. Sharing or obtaining information from other students or reference to pre-recorded information during examinations are violations of this policy and may result in an automatic NC for this course as well as more severe disciplinary penalties.

**E. LIST OF TEXTBOOKS:** The text for this course will be Biology by Campbell, Reece and Mitchell (7<sup>th</sup> edition). Note that this edition is very similar to the 6<sup>th</sup> edition by Campbell and therefore it should not be necessary to buy the 7<sup>th</sup> edition if you already have the 6<sup>th</sup> edition. The text will cover much, but not all, of what we discuss in lecture. There will also be supplementary readings available on reserve as reprints from American Scientist. In addition to the text, lecture outlines will be available from the bookstore for this course for approximately \$8.00. These are not required, but should prove handy. Please note that these outlines will not cover everything we discuss either and some other material is likely to be added over the course of the semester.

For the laboratory portion of the course, you will need to purchase the Zoology 250 Laboratory manual by John Godwin (approximate price: \$8.00). This is supplemented with online dissection guides.

Date		Lecture Topic	Reading (6 <sup>th</sup> ed)	Reading (7 <sup>th</sup> ed)
August	22	First day of Classes - Intro to course		
	24	Animal Size-the problems of being big	834-846	820-840
	27	Animal Nutrition	850-870	844-864
	29			
	31			
September	3	Labor Day - no class		
	5	Support and Movement	1075-1087	1063-1075
	7			
	10			
	12			
October	14	Internal Transport	871-884	867-883
	17			
	19			
	21	Gas Exchange	886-897	884-895
	24	<i>Exam I: covers 8/25-9/21</i>		
	26			
	28			
	1			
	3	Immunity	900-922	898-919
	5			
November	8			
	10	Regulation of the Internal Environment	925-952	922-939
	12	Fall Break - no class		
	15			
	17			
	19			
	22	<i>Exam II: covers 9/22-10/19</i>		
	24	Endocrine Systems/Hormonal Integration	955-972	943-961
	26			
	29	Reproduction	975-995	964-984
	31			
	December	2	Nervous Systems and Neural Integration	1022-1053
5				
7				
9				
12				
14		<i>Exam III: covers 10/25-11/12</i>		
16		Receptors and Sense Organs	1057-1074	1045-1063
19				
21		Thanksgiving Vacation - no class		
23		Thanksgiving Vacation - no class		
(Wednesday)	26			
	28			
	30			
	3	Neuroendocrine Systems and Behavior	No text readings	No text readings
(Wednesday)	5	Circadian Rhythms - Bora Zivkovic	No text readings	No text readings
	7	Last Day of Classes		
	12	Final Exam: 1-4 PM, Bostian 3712		

**Important Dates**

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|---------------------|---|
| August 28 Tuesday   | Last day to add a course without permission of instructor.<br><b>Pack Tracks closes for adds at 11:59 pm.</b>   |
| September 5 (Wed)   | Last day to register (includes payment of tuition and fees) or to add a course. Last day to drop a course, or change from credit to audit with tuition reduction. Last day for undergraduate students to drop below 12 hours                      |
| October 3 (Wed)     | Last day to withdraw or drop a course without a grade, change from credit to audit or credit only at the 400 level or below. Last day to submit Request for Course Repeat Without Penalty.<br><b>Pack Tracks closes for UG drops at 11:59 pm.</b> |
| December 12, 1-4 PM | Final Exam in Bostian 3712 (i.e., the regular lecture room)   |