

# Zoology 310      Animal Physiology      Spring 2009

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**Professor:** Joe Szewczak  
**Office:** Science B 320  
**Email:** joe@humboldt.edu

**Telephone:** 826-4132  
**Web Site:** <http://www.humboldt.edu/~jms139/>  
**Office Hours:** Tuesday/Thursday/ 11-1, and by appt

**Instructor:** Alex Goodell  
**Office:** Science C 106  
**Email:** ag36@humboldt.edu

**Telephone:** 826-5559  
**Office Hours:** 11-noon, Tuesday/Thursday

**Text:** Animal Physiology, 2nd Edition, Richard W. Hill, Gordon A. Wyse and Margaret Anderson, 2008. Sinauer Associates, Inc. ISBN 978-0-87893-317-4. Available at the HSU Bookstore and from other booksellers. Also helpful for supplemental reading: Animal Physiology, 5th ed, Knut Schmidt-Nielsen, 1997. Cambridge, available through used booksellers from \$10 and up.

**Course materials and announcements will be distributed on Moodle.**

**Course Objective.** The course endeavors to impart an appreciation and understanding of the problems and challenges that confront organisms in the processes that maintain life, and the diversity of solutions that have evolved. Physiology encompasses the function of the organism and its parts by which animals cope with the fundamental physical and chemical challenges of life. This course follows the comparative approach to the function and regulation of animal systems with an emphasis on vertebrates, and a focus on physiological adaptations that allow animals to live in different environments. The physiological systems considered in this course include circulation, gas exchange, neuromuscular function, excretion, acid-base and ion regulation, and temperature regulation. The unity and diversity of physiological processes in animals differing both in phylogeny and environmental adaptation is maintained as a general theme throughout this course.

**Attendance.** Class participation is mandatory if you endeavor to succeed in this course. This class has a small enough size that your absence will be noticed by your instructor and peers. Throughout the course, you are expected to *attend all lectures and labs, be prepared, and be on time*. If you must unavoidably miss a class, you are responsible for getting lecture and/or lab notes from another student in the class. Labs require extensive preparation that prohibits the possibility of arranging to make them up at another opportunity. Lab assignments will not be accepted from any student not present during the lab.

**Missed exams.** Make-up lecture exams and lab quizzes may be arranged only upon demonstration of serious extenuating circumstances (e.g., serious illness, family emergency, etc.). In the case of illness, you will need formal documentation (e.g., a note from your doctor or the Student Health Center). Other reasons for requesting a make-up will be considered on a case by case basis. No makeup exams will be given without approval *prior* to the scheduled time of the exam.

**Due dates.** Late assignments (e.g., lab reports) are strongly discouraged - *for each day late* you will lose 10% of the total possible grade.

**Students with disabilities.** Please discuss your needs with me during the first week of class. If you will be taking exams at the Testing Center, I ask that you remind me of this *at least two business days* prior to the scheduled exam so that arrangements can be made to accommodate you. Please refer to the Humboldt State University Student Disability Resource Center for further information regarding available resources: <http://www.humboldt.edu/~sdr/>

**Academic integrity.** This course expects all students to follow and uphold the Humboldt State University policy regarding academic honesty:

[http://studentaffairs.humboldt.edu/judicial/academic\\_honesty.php](http://studentaffairs.humboldt.edu/judicial/academic_honesty.php)

# Lecture & Exam Schedule Zool 310, Spring 2009

Week	Date	Topic	Reading *
1	Jan 20	Introduction to animal physiology; gen'l principles	Chapter 1, 2
	Jan 22	Molecules, diffusion, osmosis	Chapter 4
2	Jan 27	Feeding & digestion; nutrition	Chapter 5
	Jan 29	Energetics (metabolic rate) & scaling	Chapter 6, 9
3	Feb 3	Thermal physiology; ectotherms vs. endotherms	Chapter 9
	Feb 5	Thermal physiology II; mechanisms and adaptations-	Chapter 9, 10
4	Feb 10	Torpor and hibernation	Chapter 10
	Feb 12	Freeze tolerance, cryophysiology; thermophiles	Chapter 10
5	Feb 17	Electrophysiology; Nernst equation; action potentials	Chapter 11
	Feb 19	Neural integration & conduction; synapses	Chapter 11, 12
6	Feb 24	Synaptic integration; sensory physiology	Chapter 12, 13
	Feb 25	<b>Exam 1</b>	
	Feb 26	Vision, special sensory systems	Chapter 13
7	Mar 3	Neural and endocrine control; chronobiology	Chapter 14
	Mar 5	Endocrinology	Chapter 15
8	Mar 10	Muscle - comparative aspects; specialized adaptations	Chapter 18, 19
	Mar 12	Energetics and locomotion, cost of transport, migration	Chapter 8, 17
9	Mar 18	<b>Spring Break</b>	
	Mar 20		
10	Mar 24	Oxygen & Gas Exchange; Respiration in Water	Chapter 21, 22
	Mar 25	<b>Exam 2</b>	
	Mar 26	Respiratory exchange; aquatic respiratory organs	Chapter 22
11	Mar 31	Respiratory exchange; aerial respiratory organs	Chapter 22
	Apr 2	Respiratory transport of gases; blood	Chapter 23
12	Apr 7	Acid-base regulation, ectotherms and endotherms	Chapter 23
	Apr 9	Respiratory & cardiovascular integration; symmorphosis	Chapter 23
13	Apr 14	High altitude and diving physiology	p. 186; Ch 24, 25
	Apr 16	Homeostasis; cells & water; osmoregulation	Chapter 26
14	Apr 21	Electrolyte homeostasis; salt glands	Chapter 26, 27
	Apr 22	<b>Exam 3</b>	
	Apr 23	Renal physiology; comparative renal function	Chapter 28
15	Apr 28	Osmoregulation; terrestrial challenges; nitrogen excretion	Chapter 29
	Apr 30	Integrative physiology: exercise physiology	tba
16	May 5	Frontiers of physiology; phenostasis; chaos	tba
	May 7	Review & overview	
	May 14	<b>Final Exam</b> 10:20 am	everything

\* Chapter assignments refer to the textbook, additional readings will be assigned throughout the course.

**Grading.** In a perfect world, I would know all of your abilities and needs, and create tests that precisely examine your knowledge. In lieu of that I will assume a random Gaussian distribution of student abilities such that some of you will be "A" students and will set the scale (that's a fancy way of saying the grading will be on a curve). The A/B dividing line will be about 90% of the top student's score, the B/C line will be 80%, the C/D line will be 70%, and the D/F line will be 60%. Plus and minus grades (i.e., A-/B+) will be assigned around these dividing lines.

Exam I 100 pts, exam II, 100 pts, exam III, 100 pts, Final Exam 200 pts, Lab participation, papers & submitted materials, 100: total evaluation pts for the course: 600.

**Examinations.** Three midterms, and a (partially) cumulative final exam. About two thirds of the final will be new material presented after the second midterm. The other third will be material presented earlier in the course. Examination questions will cover *lecture material and conceptual material learned in labs and discussions*. Exam questions may come in a variety of formats, including (but not limited to) multiple choice, matching, short answer, and essay.

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<http://www.humboldt.edu/~sdrc/>

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**Drop policy.** After the University deadline, the course may be dropped *only* for serious and compelling reasons. In accord with University policy, I interpret "serious and compelling" to mean "unforeseeable." Illness, sudden impoverishment, and similar catastrophes qualify; poor academic performance does not qualify. Incomplete (I) is given only when extenuating circumstances ("serious and compelling" or "unforeseeable") prevent you from completing work in the course; earlier exam scores stand unchanged. Per University policy, an "I" grade remaining incomplete after one year will automatically convert to "F."

<http://www.humboldt.edu/~reg/regulations/schedadjust.html>

Students who stop attending and do not drop the class will *not* receive an Incomplete (I) and will receive a grade of **Unofficial Withdrawal (W)**. For the purposes of grade point average, a grade of "W" is equivalent to an "F". In fact, a "W" may be worse than an "F" for those students who wish to repeat the course later. Petitions to replace a grade earned in this course with a better grade may be denied if the student has withdrawn from this course unofficially.

**January 26:** Deadline – **ADD** open courses without instructor approval (i.e. magic numbers)

**February 3:** Deadline – **Add/Drop** course without \$2.00 late fee

**February 16:** Deadline – Last day to **ADD** courses

**February 16:** Deadline – Last day to **DROP** courses **without** instructor's & department chair's signatures, and serious & compelling reason. After this date, a \$10 fee required and a "W" grade will be recorded. Also, last day to drop to lower fee level & receive refund of fees, less a \$27 administrative charge.

**February 16:** Deadline – Last day to change registered class grade option to **Audit**.

**March 16:** Deadline – Last day to change registered class grade option to **credit/no credit**.

**April 17:** Deadline – Last day to **DROP** a class with serious & compelling reason (not eligible for fee refund); need instructor's & department chair's signatures. A \$10 fee required and a "W" grade will be recorded.

**Zoology 310 Animal Physiology**  
**Laboratory Schedule-** meet in SciB 328

**Spring 2009**

<b>Week</b>	<b>Date</b>	<b>Topic</b>
1	Jan 21	Introduction to computer-based data acquisition
2	Jan 26	Osmosis and membrane permeability
	Jan 28	Unifying themes of physiology
3	Feb 2	Metabolic rate and temperature, $Q_{10}$
	Feb 4	Paper discussion: evolution of endothermy, dinosaurs
4	Feb 9	Physiological scaling
	Feb 10	Paper discussion: metabolism and parasitism
5	Feb 16	Paper discussion: apneic oxygen uptake, anoxic hibernation
	Feb 18	Neurophysiology of nerve impulses
6	Feb 23	Neurotransmitters, synaptic transmission
	Feb 25	<b>Exam 1</b>
7	Mar 2	Sensory physiology
	Mar 4	Paper discussion: endocrinology
8	Mar 9	Stretch reflex
	Mar 11	Muscle mechanics
9	Mar 16	<b>Spring Break</b>
	Mar 18	
10	Mar 23	Paper discussion: animal locomotion
	Mar 25	<b>Exam 2</b>
11	Mar 30	Respiratory system mechanics
	Apr 1	Respiratory physiology: spirometry
12	Apr 6	Cardiovascular physiology, EKG
	Apr 8	Paper discussion: elephants; $O_2$ supply limitation; chaos
13	Apr 13	Paper discussion: diving & water homeostasis
	Apr 15	Peripheral circulation and control, diving response
14	Apr 20	Renal Physiology; exam review session
	Apr 22	<b>Exam 3</b>
15	Apr 27	Renal Physiology
	Apr 29	Urinalysis (pee lab)
16	May 4	Pee lab analysis; Ppr discussion: Loop length, Pregnant water balance
	May 6	Physiological adjustments and compensations: exercise
	tba	final exam review