

BIOLOGY 478 – VERTEBRATE PHYSIOLOGY

Spring, 2011 MWF 10:10 - 11:05

Serra Hall 102

Instructor: Dr. Rick Gonzalez
Office: ST483
Phone: 619.260.4077
email gonzalez@sandiego.edu
Office hours: MWF 11:15 – 12:15, MT 2:00 – 3:00
Text: Animal Physiology 2nd ed. By Hill, Wyse, & Anderson

Vertebrate Physiology Learning Outcomes

At the end of the semester a student should be able to:

1. Recognize the basic principles of thermal relations, cardiovascular and respiratory physiology, and salt and water balance in vertebrate animals.
2. Explain how physical and chemical properties shape a vertebrate animal's physiology.
3. Apply basic physiological principles to novel situation to explain how vertebrate physiological systems operate.

Grades

Your grade for this course will be earned by your performance on 3 exams: two midterms and a final. Each of the three exams will be worth 100 points, and each will cover material given in that section only. In other words, the second exam will cover material since the first exam and the final will cover material since the second exam. The midterm exams are tentatively scheduled for the following dates:

Midterm #1	February 25
Midterm #2	April 1

The final exam is scheduled for **Monday, May 16, 11 am - 1 pm.**

The scale below reflects a tentative grading scale based on previous class performances. This scale is meant to help you to gauge your performance in the class as the semester progresses. There may be some minor adjustments of this scale after the final exam as is warranted by the overall performance of the class over the entire semester.

A = 85 - 100%
B = 75 - 84%
C = 65 - 74%
D = 55 - 64%
F < 55%

Note: For those of you in lab, your lab grade will be weighted and combined with your lecture grade (1/4 lab:3/4 lecture) to determine your overall final grade for both. Grading for the lab will be discussed in your first lab meeting.

Tentative Lecture Schedule

Date	Topic	Corresponding Reading
Jan. 24	Course Introduction	
Jan. 26	Cellular Respiration - The Basics/Review	pp. 143 – 148, 167 – 173
	Calorimetry: Estimates of Metabolic Rate	pp. 148 – 155
Jan. 28	Mechanisms of Heat Transfer	pp. 207 – 213
	Overwhelming Effect of Body Size on MR	pp. 155 – 163
Jan. 31	Effects of T_A on SMR: Poikilothermy and the Tyranny of Arrhenius	pp. 213 - 228
Feb. 2	Biochemical Mechanisms of Acclimation	
	Membrane Fluidity	
Feb. 4	Extreme Temperatures	
Feb. 7	Physiological/Behavioral Adjustments to Temp	pp. 246 – 248
	Costs/Benefits of Poikilothermy	
Feb. 9	Effects of T_A on MR of Homeotherms	pp. 229 – 245
	Homeothermy in cold environments	pp. 253 – 266
Feb. 11	Homeothermy in hot environments	
Feb. 14	Intro to Respiratory and Circulatory Systems	pp. 534 – 545
	Passing Gas: The Physics of Gas Transfer	
Feb. 16	Ventilation: Mammals	pp. 561 – 568
Feb. 18	The Weird Lungs of Birds	pp. 569 – 572
	Breathing Air vs. Breathing Water	pp. 543 – 544, 554 – 558
Feb 21	Breathing in Amphibians & Reptiles	pp. 558 – 561
	Blood: Hemoglobin Overview	pp 582 – 592
	Hemoglobin in O_2 transport	
Feb 23	Review	
Feb 25	Midterm I	
Feb 28	Bohr Effect/Root Effect	pp. 592 – 596
	Application: Swimbladder Function	
March 2	Blood: Mechanisms of CO_2 transport	pp. 603 – 607
March 4	Acid-Base Regulation: Buffer Basics	pp. 607 – 609
March 7	pH Defense, Correction, and Diagnosis	
March 9	Circulation: Physics of Fluid Flow	pp. 619 – 627
March 11	Circulation: Systemic Circuit	
	Control of Flow and Pressure	
March 14 - 18	Spring Break – No Classes	
March 21	Venous Return	
	Effects of Gravity	
March 23	Pulmonary Circuit	
	Heart Function: Cardiac Cycle	pp. 612 – 618
March 25	Non-Mammalian Hearts	pp. 627 – 634
	Application: Tissue Hypoxia with Exercise	pp. 179 – 183
March 28	Hypoxia at High Altitudes	pp. 566 – 567, 602
	Hypoxia: Diving Mammals / Water Breathers	pp. 643 – 660
		pp. 183 – 188

March 30	Review	
April 1	Midterm II	
April 4	Salt/Water Balance: The Basics Internal Fluid Compartments	pp. 676 – 678
April 6	Osmoregulation in Freshwater	pp. 681 – 687
April 8	Osmoregulation in Marine Environments Euryhalinity	pp. 687 – 691
April 11	Terrestrial Animals - Water Balance	pp. 700 – 714
April 13	Terrestrial Animals - Salt Balance Nitrogenous Waste Excretion	pp. 757 – 762 pp. 744 – 748
	Intro to Mammalian Kidney	pp. 715 – 719
April 15	Nephron Function: Filtrate Formation Autoregulation of GFR	pp. 724 – 738
April 18	Nephron Function: Modification of Filtrate	
April 20	Creation of Medullar Conc. Gradient Kidney Function: Salt, Water, Acid-Base Reg.	
April 22 – 25	Easter Break – No Classes	
April 27	Comparative Aspects of Renal Physiology	pp. 719 – 723, 738 – 739
April 29	Nerves - Resting Potentials Action Potentials/Repolarization Conduction of Action Potentials	pp. 277 – 285 pp. 285 – 297 pp. 297 – 302
May 2	Synaptic Transmission Skeletal Muscle Anatomy Muscle Contraction	pp. 302 – 325 pp. 488 – 496 pp. 505 – 508
May 4	Excitation - Contraction Coupling Fiber types/Training Effects	
May 6	Cardiac & Smooth Muscle	pp. 509 – 512
May 9	Review	
