

BIO 549 - ADVANCED TOPICS IN ANIMAL PHYSIOLOGY

Course Syllabus - Spring 2005

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DATE	LECTURE TOPIC
Jan. 6	Introduction: Course format, content, goals; laboratory assignment
Jan. 11	Nature and levels of adaptation: terminology/definitions, physiological responses on different scales; environmental stress; selection and the environment
Jan. 13	Avoidance, conformity, regulation; adaptations at the molecular and genome levels; physiological regulation of gene expression
Jan. 16	The problems of size and scale: isometric/allometric scaling; scaling of metabolic rate and locomotion
Jan. 20	Water, ions, osmotic physiology: properties of water, measuring concentrations in biological systems; passive movements of water and solutes
Jan. 25	Electrochemical balance across membranes; Donnan equilibrium, Nernst equation, facilitated transport, active transport
Jan. 27	Components of water balance; toleration of water loss, exchanges occurring at integumentary level
Feb. 1	Hyposmotic regulation/salt uptake; hyperosmotic regulation/salt excretion
Feb 3	Terrestrial animals: water uptake mechanisms; methods for minimizing integumentary and respiratory water loss
Feb. 8	Osmoregulatory organs and their excretory products
Feb. 10	Comparative physiology of nitrogenous excretion
Feb. 15	Quiz
Feb. 17	Temperature and its effects: thermal environments; physical avenues of heat exchange; influence on biological rate functions (Q_{10})
Feb. 22	Thermal effects of membranes; homoviscous adaptation; heat shock proteins
Feb. 24	Strategies in thermal biology; patterns of body temperature regulation; facultative hyperthermia; nocturnal hypothermia; thermal consequences of coloration

- March 8 Keeping warm: low temperature effects on cells and organisms; freeze-tolerant/
freeze-intolerant animals
- March 10 Behavioral strategies: avoidance, migration, insulation, metabolic heat production
- March 15 Thermal acclimation; evolution of endothermy
- March 17 Adaptations to extreme environments
- March 22 Metabolism and energy supply; anaerobic metabolic pathways
- March 29 Aerobic metabolism; fuel sources, energy budgets
- March 31 Quiz
- April 5,7, 12, Student reports
14, 18, 21