

Grading

Assignments are due *no later than the beginning of lecture* on the due date. Late assignments will be penalized at least 10% for each day they are late. There will be no 'make up' exams or 'extra credit'. We realize that you have lives (cars do break down, people die, stuff happens). In exceptional cases, and if arrangements are made in advance, we will consider your unique situation.

Grades will generally be distributed as follows (any potential curving of final grades will not "hurt" you):

≥ 90%	A
80-89%	B
70-79%	C
60-69%	D
≤ 59%	F

Any student with a documented disability who feels they may need academic adjustments or accommodation is requested to speak with the instructor by the 2nd week of class. All related discussions will remain confidential. Students should contact the S.A.L.T. Center for Learning Disabilities (Old Main, Room 135; 621-1242) or the Center for Disability Related Resources (2nd and Cherry; 621-3268) prior to discussions with the instructor. These offices will verify the need for special services.

Attendance

You are expected to attend each lecture and each discussion/laboratory session prepared and ready to contribute.

Class meeting suggestions:

Please consider employing these suggestions (borrowed from Guy McPherson) during class discussions:

1. Listen carefully to others before speaking
2. Challenge and refute ideas, not people
3. Focus on the best ideas, not on being the best, or "winning"
4. Before adding your own contribution, practice listening by trying to formulate in your own words the point that the previous speaker made
5. Speak whenever you wish (without interrupting!) even though your ideas may seem incomplete
6. Avoid disrupting the flow of thought by waiting until the present topic reaches its natural end before introducing a new issue
7. If you wish to introduce a new topic, warn the group that what you are about to say will address a new topic and that you are willing to wait to introduce it until people are finished commenting on the current topic
8. Give encouragement and approval to others

Course Work Details

Lecture Exams

There will be three midterm examinations and a fourth, final examination. The final will be cumulative. Topics covered in the formal lecture period, in discussion/lab, by guest speakers, and in the assigned text reading will be fair game. Format will be mixed and may include: matching, fill-in, multiple choice, short answer, and essay. We may occasionally have some portion of an exam as a take-home essay. Be prepared to synthesize ideas, rather than just regurgitate information. There will be no make-up exams.

Term Paper

The term paper will be your opportunity to research a topic of interest to you that is appropriate for a vertebrate physiology course with emphasis on physiological systems. You will be expected to synthesize relevant information from the primary literature (containing original research results) in a well-written paper. You will be graded in four stages: topic and annotated references (25 pts.), first draft (50 pts.), peer review/edit (50 pts.), and final submission (75 pts.). More details will be forthcoming in your discussion section.

Oral Presentation

After you finish your term paper, you will have the opportunity to tell your classmates about the information you compiled. This presentation will consist of a ten minute oral powerpoint presentation accompanied by a useful handout (1 piece of paper only) that will allow your peers to recall the important points from your presentation. More details will be forthcoming in your discussion section.

Discussion Participation

Your participation in discussion will be graded. Your participation consists of attendance, preparedness (Have you read the material? Did you retain enough to do well on a short quiz?), and contribution to appropriate discussion of the physiological topics at hand. Occasionally we will do short labs or problem sets and these may include a short, graded write-up as well.

Short Seminar/Article Write-Ups (3x33.33 points)

You should attend two seminars/talks on campus that are relevant to this course. Write up a one or two page (typed and double spaced) summary of each seminar. We will provide suggestions of appropriate seminars as the semester progresses. One short write-up is due no later than 28 October, the other is due no later than our last lecture (09 December). Again, the topic must be physiological and appropriately scientific. Please contact the instructors if you have questions about the appropriateness of a specific talk you are considering attending.

Early in the semester (due 17 September in lab) you will write up a 2-page article summary. More details forthcoming in lab.

Tentative Lecture Schedule

<u>Lect</u>	<u>DATE</u>	<u>TOPIC and (READING in Randall et al., 2002)</u>
1	AUG 26	Introduction to course and to vertebrate physiology (CH1)
		Overview of Krogh, hypotheses, methods, physiological state (CH2)
D1	AUG 27	Introduction to primary literature, readings, article summary, term paper, oral presentation
2	AUG 28	Overview of solutions, biological molecules, etc. (CH3)
		Overview of membranes, channels, transporters, gradients (CH4)
3	SEP 2	Continue CH4 , begin Physical basis of neuronal function (CH5)
D2	SEP 3	Put it in context: Lienhard et al. 1992, Nesse and Williams 1998
4	SEP 4	Neuronal function, neuronal communication (CH5, 6)
5	SEP 9	Neuronal communication, sensing the environment (CH6, 7)
D3	SEP 10	Specialized senses; Catania 2002, De Cock Buning 1983, Barinaga 1999, Malakoff 1999, Mori et al. 1999
6	SEP 11	Sensing the environment, organization and evol. of the nervous system (CH7, 8)
7	SEP 16	Organization and evolution of the nervous system (CH8)
SW D4	SEP 17	Cotransporter, Ion Concentrations; Pelis et al. 2001 (<u>2-page write-up due</u>)
P1 8	SEP 18	<u>Term Paper Topic and Annotated Reference List Due</u>
		Wrap up nervous function (CH5-8)
9	SEP 23	Glands and hormones (CH9)
D5	SEP 24	Hormones; Ulmann et al. 1990, DeNardo and Sinervo 1994
E1 E1	SEP 25	Midterm Lecture <u>EXAM 1</u> (covers lectures 1-8; discussions 1-4; CH1-8)
10	SEP 30	Glands and hormones (CH9)
D6	OCT 1	Exam 1 return, discuss term papers Acetylcholine receptors; Miyazawa et al. 2003.
11	OCT 2	Muscles and movement (CH10)
12	OCT 7	Muscles and movement (CH10)
D7	OCT 8	Locomotion and movement; Wilson et al. 2002, Dickinson et al. 2000
13	OCT 9	Muscles and movement (CH10)

P2	14	OCT	14	Behavior initiation, patterns, control (CH11); <u>Term Paper First Draft Due</u>
	D8	OCT	15	Behavioral control; Marler et al. 1999, Smith and John-Alder 1999
	15	OCT	16	Integration of physiological systems – circulation (CH12)
E2	E2	OCT	21	Midterm Lecture <u>EXAM 2</u> (covers lectures 9-14; discussions 5-8; CH9-11)
	D9	OCT	22	Circulation; Lillywhite 1988; review exam 2
	16	OCT	23	Integration of physiological systems – circulation (CH12)
SW	17	OCT	28	Gas exchange, acid-base balance (CH13); <u>Seminar Write-Up #1 Due</u>
	D10	OCT	29	Blood chemistry and buffering; Jackson et al. 2000 discuss term papers, return exams
	18	OCT	30	Gas exchange, acid-base balance (CH13)
	19	NOV	4	Ionic and osmotic balance, kidney function (CH14) ELECTION DAY!
	D11	NOV	5	Drought effects; Henen et al. 1998
P2	20	NOV	6	Ionic and osmotic balance, kidney function (CH14); <u>Term Paper Draft for Peers</u>
VD	VD	NOV	11	Veterans Day- no class
	D12	NOV	12	The depths and the heights; Zapol 1987, Gonzalez et al. 1990
P3	21	NOV	13	Ionic and osmotic balance, kidney function (CH14); <u>Term Paper Peer Review/Edit Due</u>
	22	NOV	18	Energy acquisition, digestion, metabolism (CH15)
E3	D13	NOV	19	Midterm Lecture <u>EXAM 3</u> (covers lectures 15-21; discussions 9-12; CH12-14) (take-home portion as well - due tomorrow in lecture?)
	23	NOV	20	Energy acquisition, digestion, metabolism (CH15)
	24	NOV	25	Energy expenditure (CH16)
	D14	NOV	26	T.B.A.
Yum yum	Yum yum	NOV	27	Thanksgiving (no lecture)
	25	DEC	2	Energy expenditure (CH16)
	D15	DEC	3	Ramifications of altered environments; Mendes 2002, Hayes et al. 2002
P4	26	DEC	4	Environmental challenges (CH17); <u>Term Paper Final Draft Due</u>
SW	27	DEC	9	Environmental challenges (CH17), <u>Seminar Write-Up #2 Due (this would be a good day to get your powerpoint file to us)</u>

OP D16 DEC 10 **Student Oral Presentations**

FE FE DEC 16 **FINAL EXAM** (8:00–10:00; cumulative, more detailed emphasis on material since 3rd midterm)

Reading List ECOL 437 Vertebrate Physiology Fall 2003 K.E. Bonine

**Scientific American Readings are NOT in the reading packet, but will be made available on electronic reserve.

03 Sept.

Lienhard, G. E., J. W. Slot, D. E. James, and M. M. Mueckler. 1992. How cells absorb glucose. *Sci. Am.* 1992(Jan):86-91.

Nesse, R. M. and G. C. Williams. 1998. Evolution and the origins of disease. *Sci. Am.* 1998(Nov):86-93.

10 Sept.

Catania, K. C. 2002. The nose takes a starring role. *Sci. Am.* 2002(July):54-59.

De Cock Buning, T. 1983. Thermal sensitivity as a specialization for prey capture and feeding in snakes. *Amer. Zool.* 23:363-375.

Barinaga, M. 1999. Salmon follow watery odors home. *Science* 286:705-706.

Malakoff, D. 1999. Following the scent of avian olfaction. *Science* 286:704-705.

Mori, K., H. Nagao, and Y. Yoshihara. 1999. The olfactory bulb: coding and processing of odor molecule information. *Science* 286:711-715.

17 Sept. (write up 2 page summary of this article and bring to lab)

Pelis, R. M., J. Zydlewski, and S. D. McCormick 2001. Gill Na⁺-K⁺-2Cl⁻ cotransporter abundance and location in Atlantic salmon: effects of seawater and smolting. *Am J Physiol Regulatory Integrative Comp Physiol.* 280:R1844-R1852.

24 Sept.

Ulmann, A., G. Teutsch, and D. Philibert. 1990. RU 486. *Sci. Am.* 262(June):42-48.

DeNardo, D. F. and B. Sinervo. 1994. Effects of corticosterone on activity and home-range size of free-ranging male lizards. *Hormones and Behavior* 28:53-65.

01 Oct.

Miyazawa, A., F. Yoshinori, and N. Unwin. 2003. Structure and gating mechanism of the acetylcholine receptor pore. *Nature* 423:949-955.

08 Oct.

Wilson, R. S., R. S. James, and R. Van Damme. 2002. Trade-offs between speed and endurance in the frog *Xenopus laevis*: a multi-level approach. *J Exp Biol* 205:1145-1152.

Dickinson, M. H., C. T. Farley, R. J. Full, M. A. R. Koehl, R. Kram, and S. Lehman. 2000. How animals move: an integrative view. *Science* 288:100-106.

15 Oct.

Marler, C. A., S. K. Boyd, and W. Wilczynski. 1999. Forebrain arginine vasotocin correlates of alternative mating strategies in cricket frogs. *Hormones and Behavior* 36:53-61.

Smith, L. C. and H. B. John-Alder. 1999. Seasonal specificity of hormonal, behavioral, and coloration responses to within- and between-sex encounters in male lizards (*Sceloporus undulatus*). *Hormones and Beh.* 36:39-52.

22 Oct.

Lillywhite, H. B. 1988. Snakes, blood circulation and gravity. *Sci. Am.* 259(Dec):92-98.

29 Oct.

Jackson, D. C., A. L. Ramsey, J. M. Paulson, C. E. Crocker, G. R. Ultsch. 2000. Lactic acid buffering by bone and shell in anoxic softshell and painted turtles. *Physiological and Biochemical Zool.* 73:290-297.

05 Nov.

Henen, B. T., C. C. Peterson, I. R. Wallis, K. H. Berry, and K. A. Nagy. 1998. Effects of climatic variation on field metabolism and water relations in desert tortoises. *Oecologia* 117:365-373.

12 Nov.

Zapol, W. M. 1987. Diving adaptations of the Weddell seal. *Sci. Am.* 256(6):100-105.

Gonzalez, N. C., T. Albrecht, L. P. Sullivan, and R.L. Clancy. 1990. Compensation of respiratory alkalosis induced after acclimation to simulated altitude. *J Applied Physiol* 69:1380-1386.

03 Dec.

Mendes, J. J. A. 2002. The endocrine disruptors: a major medical challenge. *Food and Chemical Toxicology* 40:781-788.

Hayes, T. B., A. Collins, M. Lee, M. Mendoza, N. Noriega, A. A. Stuart, and A. Vonk. 2002. Hermaphroditic, demasculinized frogs after exposure to the herbicide atrazine at low ecologically relevant doses. *PNAS* 99:5476-5480.