

Animal Physiology: BIO 228, Fall 2016

Lecture: Wednesday / Friday 10:30 am-11:45am; OH 169

Lab: Friday 1:30pm-5:30pm; OH 256

Contact Info: Megan D. Gall; OH A52; megall@vassar.edu; phone: x7115

Drop in office hours: Wednesday and some Fridays 12-1:15 at the Bridge Building Café.

Other good times to meet with me: By appointment in my office (Wednesday 9-10:15, usually 3:15-5). I'm also happy to chat over dinner at ACDC or over lunch at the Retreat. Monday and Thursdays are research days and I may or may not be available by appointment on those days.

Course Materials

Text: Animal Physiology 3rd Edition by Hill, Wyse, & Anderson

Other: Lab Manual – this will be provided in lab and/or on Moodle.

Course Description:

In this course we will explore the common physiological tasks animals must conduct during their lives including acquiring and using energy (feeding, digestion, nutrition, metabolism); obtaining and circulating oxygen (respiration and circulation); staying hydrated (osmotic regulation and excretion); navigating the world (movement, muscles, biomechanics); and coordinating physiological function with the environment (information and sensory systems; neural control and integration, the endocrine system). We will use a comparative approach to understand how physiological systems and functions evolved in different taxa. We will also use a comparative approach to understand the importance of the relationship between ecology and physiology.

Course Goals:

1. Understand and explain the fundamental principles and mechanisms of physiology.
2. Use information about the ecology, evolution and behavior to predict the physiological function of organisms.
3. Critically analyze and present information from primary literature.
4. Convey information about animal physiology in written and oral formats.
5. Become comfortable *not* knowing the answer - scientists are interested in the unknown!

GRADING

Exams (100 points each):	300
Article Summaries/Discussion Questions (10 points each, pick 6)	60
Article Presentation	60
Lab assignments	110
Independent Research Project	170
Final Exam	100
Total	800

Note: Grade breakdowns for the assignments within each of the categories above can be found in the gradebook area of Moodle.

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TENATIVE SCHEDULE (note: the class schedule will be available via Moodle)

Week (Date)	LAB	LECTURE	Chapters*
Week 1 Aug. 31-Sept. 2	Stats Lab	8/31: Key Concepts in Physiology 9/2: Molecules in Physiology 1	1,2
Week 2 Sept. 7-9	Allometry lab	9/7: Molecules in Physiology 2 9/9 Food and Energy 1 <i>Paper Presentation/Summary 1 DUE</i>	5 6
Week 3 Sept. 14-16	Digestive Enzyme Lab	9/14 Food and Energy 2 9/16 Temperature 1 <i>Paper Presentation/ Summary 2 DUE</i>	7 10
Week 4 Sept. 21-23	Crayfish Metabolism 1 Independent project discussion	9/21 Temperature 2 9/23: Energetics of Aerobic Activity <i>Paper Presentation/ Summary 3 DUE</i>	11 9
Week 5 Sept. 28-30	Crayfish Metabolism 2 Independent Project Proposal Outline Due	9/28: TEST 1 (Energy and Temperature) 9/30: Oxygen 1: Respiration <i>Paper Presentation/ Summary 4 DUE</i>	22
Week 6 Oct. 5-7 (last week to drop)	Start Hormone and Behavior <i>Paper Presentation/ Summary 5</i> Full Proposal DUE Friday by 5	10/5: Oxygen 2: Respiration / Circulation 10/7: Oxygen 3: Circulation <i>Paper Presentation/ Summary 6 DUE</i>	23 24,25
Week 7 Oct. 12-14	Human Respiration/Circulation	10/19: Water 1: Osmotic Regulation 10/21: Water 2: Excretion <i>Paper Presentation/ Summary 7 DUE</i>	27,28 29
Week 8 Oct. 19-21	NO LAB (Fall Break)	No Class (Fall Break)	
Week 9 Oct. 26-28	Finish Hormone Lab	10/26: Water 3: Comparative water conservation 10/28: TEST 2 (Oxygen and Water)	30
Week 10 Nov. 2-4	Eye and Brain Dissection	11/2: Sensory processing 11/4: Neurophysiology 1 <i>Paper Presentation/ Summary 8 DUE</i>	14 12
Week 11 Nov. 9-11	Independent Research Progress Presentations (Group 1)	11/9: Neurophysiology 2 11/11: Neurophysiology 3 <i>Paper Presentation/ Summary 9 DUE</i>	13 15
Week 12 Nov. 16-18	Independent Research Progress Presentations (Group 2)	11/16: Muscles and Movement 1 11/18: Muscles and Movement 2 <i>Paper Presentation/ Summary 10 DUE</i>	19 20
Week 13 Nov. 23-25	NO LAB	11/23: TEST 3 (Neuromuscular) 11/25: NO CLASS - THANKSGIVING	
Week 14 Nov. 30 - Dec. 2	Independent Research	11/30: Reproduction 12/2: Biological Clocks <i>Paper Presentation/ Summary 11 DUE</i>	17 15
Week 15 Dec. 7	(RESEARCH PAPER DUE) Research Presentations	12/7: Integrative Animal Physiology <i>Paper Presentation/ Summary 12 DUE</i> Tues/Wed = Thurs/Fri	

*These are the chapters associated with the lecture, but we will not cover all material. I suggest that you use the textbook as a reference, rather than a text to be read in its entirety. Skimming the summary sections before class is recommended.

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Lecture Exams: The three lecture exams will cover notes given in class and pertinent information from the textbook. Some notes will come from sources other than the text. The first three exams will be over material covered during the exam period. *The final exam will be a scenario based solo/group test. It will be a cumulative test, covering all the information covered in lecture and lab.

Make up policy: The makeup will be a take-home essay exam administered at the end of the semester. You will only be allowed to make up one exam; you will receive a zero for each exam beyond that.

Article Summaries: Each week we will read and discuss primary literature and review papers. Students will present (twice) these papers in groups of 3. Each student will turn in (at the beginning of class) a ½-1 page lay summary for **6 (of 12)** articles of his or her choosing. If you turn in more than 6 summaries, the 6 with the highest scores will count towards your grade.

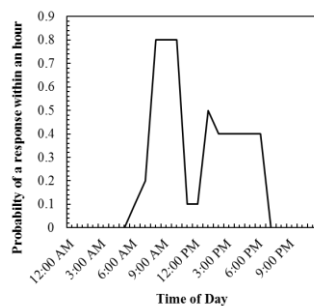
Participation: Participation in both the class and labs is HIGHLY encouraged. You will not be able to make-up labs. An unexcused absence from lab will result in the loss of your participation points.

Laboratory: Lab assignments: Keep track of your experiments and your data in your lab manual (best in a binder). There will be questions and problems associated with the lab that you will be required to turn in at the end of the lab period or in a designated lecture period. There may also be occasional pre-lab quizzes. Independent Research: The last four weeks of lab you will be conducting and presenting your independent research (in groups of 3). Each group will turn in a single proposal outline (including materials needed and references). Each group will then use their graded outlines to create a full research proposal. You must have a section in your proposal indicating the contribution of each individual to the final proposal. This proposal and your research plan will be presented to the class. You will also write an (individual) research paper and give a (group) oral presentation at the end of the project.

Late Policy: Late article summaries will not be accepted. For all other assignments you have a total of 2 grace days during the semester (write “grace day” on top of a late assignment). After your two grace days there will be a 5% penalty for each 24 hour period that an assignment is turned in late.

Originality and Attribution: You are responsible for following the procedures detailed in the handbook, Originality and Attribution: A Guide for Student Writers at Vassar College. If you have any questions about attribution, you must see me well before an assignment is due.

E-mail and Electronics Policy (Monday through Friday):



Phones should not be used in class or in lab. If you need to do calculations, you may use a calculator or excel. Phone use may result in the loss of participation points. Laptops are allowed in class and lab, but I reserve the right to ban their use on an individual or class basis if they are being used for non-class activities (e-mail, facebook, etc.) or distracting other students.

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ACCOMMODATIONS:

Academic accommodations are available for students registered with the Office for Accessibility and Educational Opportunity. Students in need of ADA/504 accommodations should schedule an appointment with me early in the semester to discuss any accommodations for this course that have been approved by the Office for Accessibility and Educational Opportunity, as indicated in your AEO accommodation letter.

Grades:

% Points	Final Grade
95-100:	A
91-94.99:	A-
87-90.99	B+
83-86.99	B
80-82.99	B-
77-79.99	C+
72-76.99	C
70-71.99	C-
67-69.99	D+
60-66.99	D
0-59.99	F

From the Vassar Catalogue

A indicates achievement of distinction. It involves conspicuous excellence in several aspects of the work.

B indicates general achievement of a high order. It also involves excellence in some aspects of the work, such as the following:

- Completeness and accuracy of knowledge
- Sustained and effective use of knowledge
- Independence of work
- Originality

C indicates the acceptable standard for graduation from Vassar College. It involves in each course such work as may fairly be expected of any Vassar student of normal ability who gives to the course a reasonable amount of time, effort, and attention. Such acceptable attainment should include the following factors:

- Familiarity with the content of the course
- Familiarity with the methods of study of the course
- Evidence of growth in actual use both of content and method
- Full participation in the work of the class
- Evidence of an open, active, and discriminating mind
- Ability to express oneself in intelligible English

C-, **D+**, and **D** indicate degrees of unsatisfactory work, below standard grade. They signify work which in one or more important respects falls below the minimum acceptable standard for graduation, but which is of sufficient quality and quantity to be counted in the units required for graduation. Work evaluated as **F** may not be counted towards the degree.

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Readings for Journal Article Summaries and Presentations

1. Andrews, C.B., Mackenzie, S.A. and Gregory, T.R. 2009. Genome size and wing parameters in passerine birds. *Proceedings of the Royal Society B* 276: 55-61.
2. Secor, S.M. and Diamond, J.M. 2000. Evolution of regulatory responses to feeding in snakes. *Physiological and Biochemical Zoology* 73: 123-141.
3. Costanzo, J.P., Lee, R.E. and Lortz, P.H. 1993. Glucose concentration regulates freeze tolerance in the wood frog *Rana sylvatica*. *Journal of Experimental Biology* 181: 245-255.
4. Casey, J.P., James, M.C., Willard, A.S. 2014. Behavioral and metabolic contributions to thermoregulation in freely swimming leatherback turtles at high latitudes. *Journal of Experimental Biology* 217: 2331-2337.
5. Barki, A., Karplus, I., Khalaila, I., Mano, R. and Sagi, A. 2003. Male-like behavioral patterns and physiological alterations induced by androgenic gland implantation in female crayfish. *Journal of Experimental Biology* 206: 1791-1797.
6. Kooyman, G.L. and Ponganis, P.J. 1998. The physiological basis of diving to depth: birds and mammals. *Annual Reviews in Physiology* 60: 19-32.
7. Scott, G.R. 2011. Elevated performance: the unique physiology of birds that fly at high altitudes. *Journal of Experimental Biology* 214: 2455-2462.
8. Nicholson, S.W. and Fleming, P.A. 2014. Drinking problems on a 'simple' diet: physiological convergence in nectar-feeding birds. *Journal of Experimental Biology* 217: 1015-1023.
9. Wong, A. and Gall, M.D. 2015. Frequency sensitivity in the auditory periphery of male and female black-capped chickadees. *Zoology*.
doi:10.1016/j.zool.2015.04.002 .
10. Arellano, C.J. and Kram, R. 2014. The metabolic cost of human running: is swinging the arm worth it? *Journal of Experimental Biology* 217: 2456-2461.
11. Dominoni, D.M, Helm, B., Lehmann, M., Dowse, H.B. and Partecke, J. 2013. Clocks for the city: circadian differences between forest and city songbirds. *Proceedings of the Royal Society B* 280: 20130593.
12. Suthers, R.A., Vallet, E. and Kreutzer, M. 2012. Bilateral coordination and the motor basis of female preference for sexual signals in canary song. *Journal of Experimental Biology* 215: 2950-2959.

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Instructions for Summaries and Discussion Questions

Each week we will read and discuss a scientific paper (either a primary literature paper or a review article). You must choose 6 of the 12 papers on which to write a summary (although you should READ all of them).

The summary should be ½ - 1 page in length and written in a way that a well-educated non-scientist can understand (we call this a lay summary). In your summary you should describe (1) the problem or question in which the authors were interested, (2) their hypotheses and predictions, (3) how they answered their question (i.e. methods) or how they developed their argument (if a review paper), (4) the importance of their results and /or how they interpreted their results.

Instructions for Journal Article Presentations

You will choose one article to present to the class and on which to lead a discussion. The combined time for presentation and discussion will be 20-30 minutes. You will present in groups of three.

- a. One person should present the introduction, one the methods, and one the discussion. In the case of a review article, you may elect to divide the article equally.
- b. You should divide the tables and figures equally to present to the class. When presenting the results be sure to explain the data in the figure and how it relates to the hypotheses and predictions. I recommend the use of powerpoint to present the data.
- c. You will lead a short discussion of the paper (time permitting). Other students will turn in discussion questions which you may use to help steer the discussion.

If you come say “hi” to me in my office by the end of the first week (Friday by 5pm) I will give you 5 extra credit points.