

Zoology 430/430L: Animal Physiology - Fall 2022

Instructor: Dr. Marguerite Butler, Office: EDM 316, mbutler808@gmail.com

TAs: Ms. Allison Fisher, arfisher@hawaii.edu (TA)

Office Hours: by appointment.

COVID-19 POLICIES:

Mask use is required for this class due to the in-person labs, and full vaccination is strongly encouraged. These are real physiology labs requiring working in close proximity to your lab partners and we cannot guarantee that 3 ft. distance can be maintained between people at all times. You are considered *fully vaccinated 2 weeks after your second dose of the Pfizer-BioNTech or Moderna COVID-19 vaccines, or 2 weeks after the single-dose Johnson & Johnson's Janssen COVID-19 vaccine.*

Mask use is required at all times indoors in lab and in the classroom. Hand sanitizer will be provided. Please remember that the omicron variant is transmissible between fully vaccinated individuals, and even though vaccination may protect you from serious disease, some of us may be living with children too young to be vaccinated or elderly or immunocompromised individuals. Masks are effective in reducing transmission. Let's take care of each other.

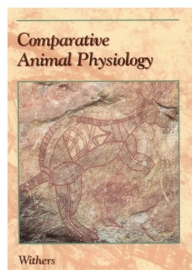
Labs are planned to be in person in EDM 101. Lectures will be MWF in person in AGSCI 220

COURSE OBJECTIVES:

(1) Teach basic principles of animal physiology, (2) Practice the scientific method and strengthen critical thinking skills and active, self-directed learning by putting into practice the scientific method, (3) Engender good laboratory skills and approaches to physiological experimentation, (4) Develop scientific writing and speaking skills, (5) Promote proficiency in reading primary scientific literature and improve ability to find that literature, (6) Promote skills necessary to engage in productive intellectual interactions and successful collaboration.

COURSE METHODS:

We will learn science by practicing science. Students will learn through assigned **readings**, will come to class prepared for **productive discussion**, practice scientific problem-solving by completing **homeworks**, and engage in project-based learning. Labs will reinforce learning through experimentation and writing lab reports. **Attendance in lecture and labs is mandatory.** Learning is a developmental process, attendance and engagement is necessary to improve. As this is a **writing and oral intensive course**, we will learn by reviewing, editing, and rewriting your work as well as develop of effective scientific arguments through oral presentation.



EXPECTED OUTCOMES:

Upon completion of this course, you should (1) Understand basic principles in animal physiology, such as how animals remain in homeostasis in the face of changing internal or external environments, the role of fluxes and the expenditures of energy against them, and the various solutions that vertebrate lineages have evolved to life's challenges (2) Be able to apply these principles to novel situations, (3) Be able to write a well-researched and reasoned scientific paper, (4) Be able to design and perform basic laboratory experiments, and (5) Understand that science is advanced by the creative application of past knowledge to new situations to generate new knowledge.

ENROLLMENT:

This is a very popular course that provides a unique learning experience at UH. Repeat students cannot enroll until after those taking it for the first time are accommodated. If you are a first-timer, and really want into the course, please attend all classes and let me know.

COURSE MECHANICS:

REQUIRED TEXT: *Comparative Animal Physiology* by Phillip C. Withers, 1992.

Rent a copy for a \$20 deposit, refundable when book is returned from the Biology Office EDM 216.

If you want your own copy, Order online and **use EXPEDITED SHIPPING** or your book may take 4-6 weeks to arrive!

• **Amazon.com** or **half.com** or **alibris.com** etc. (or try google books “see all sellers”). **OPTIONAL: *Animal Physiology*** by Hill, Wyse, and Anderson. Or any upper-level comparative or human physiology book.

<http://www.sinauer.com/catalog/biology/animal-physiology-361.html>

• Get a **used book** or older edition if you’d like to save money (via **Expedited Shipping!**).

Lab Manual will be posted on website.

Course Website: <http://animalphys.butlerlab.org> All information for both the lecture and laboratory is posted here, including reading assignments, problem sets, laboratory exercises and reports. I will add you to the site and a course listserv using your UH ID. If you want to use an alternative email LMK: mbutler808@gmail.com.

Course SLACK channel for questions, day-to-day communication: https://join.slack.com/t/animalphysuh-2021/shared_invite/zt-uguu87ub-8RAhBrqZqzMM8kmSJyY1Xg

Grades and quizzes will be posted on Laulima: <https://laulima.hawaii.edu/>

Course FaceBook group: <https://www.facebook.com/groups/AnimalPhysiologyUH/> Join for extra credit. One point per week for any type of post related to Animals (biology, not pets) and/or Physiology.

Discussion

Class time is mainly for interacting with the content through discussion. Successful students take discussion seriously. Read, ponder the study questions, and come to class prepared to engage in a high-level discussion in your discussion group of 3, assigned at random each week. Discussion grades are via evaluation by your partners averaged together (based on quality of contributions, preparation, participation). **Failure to attend = zero grade discussion grade.** Teaching staff can override grades for poor contribution at our discretion.

Successful discussion requires a respectful attitude and collaborative behavior.

- Seek input from all members - quickly establish baseline from all before diving deeper
- Listen before contributing again
- Encourage participation from all — if someone is quiet, ask for their input/thoughts
- Respect cultural differences, do not judge people based on communication style
- Discussions are not about “scoring points” — they are about going deeper and getting creative.

Problem Sets

Problem sets are designed to help you master the lecture material AND to prepare for the modeling calculations you will have to do in your animal design projects. Problem sets are posted online and due in one week at the start of lecture.

- **Everyone must do their own work**
- **Homeworks must be hand-written by yourself. Draw pictures by hand. On paper or by tablet is OK.**
- Come for help if you are stuck.
- You may collaborate by working together — you may discuss strategies for solving the problems. **DO NOT ASK FOR OR GIVE OUT THE WORKED OUT ANSWER UNDER ANY CIRCUMSTANCES.**
- Cheating or abuse of the honor system will result in big changes in the course.

Animal Design Project

The major project of this course. Work in a team of two to design four physiological systems of an extinct vertebrate animal: metabolism, digestion, respiration, and excretion (or your original design). Collect background information and improve a Wikipedia page for your animal. Do a short modeling report for each system (~2 typed, double-spaced pages with diagrams and calculations). A final term paper on the topic most interesting to you. Peer review and opportunity to revise. More details on last page of syllabus under “Animal Design Project.” Make 2 oral presentations.

Information Sources

Your instructors, textbooks, books on organismal biology and paleontology in Hamilton Library, and the Internet are good places to start. References cited in your paper should be from the *PRIMARY SCIENTIFIC LITERATURE* (i.e., **scientific books**, review articles, and primary research articles from **peer-reviewed professional scientific journals**). Books and journals for the general public are not acceptable. Use of websites are discouraged, only those maintained by research institutions (e.g., scientific museums) may be used. **DO NOT CITE CREATIONIST or POPULAR websites.**

Use the online UH library databases specifically designed to search for scientific articles, for example web of science, google scholar, or zoological record.

UH Library science databases and E-journals: <http://www.hawaii.edu/sciref/>.

ZOOL430 library study guide is at: <https://goo.gl/VUoPGQ>

Good websites for exploring potential fossils:

Tree of Life Project: <http://www.tolweb.org/tree/>

Oral Presentations

You will present two 10 minute **oral presentations** on your animal design: in week 8 during the lab session, and at the end of the semester in the lecture. Scientific talks are for receiving feedback on *work in progress* from the scientific community before their paper is finalized, so you are encouraged to speak on work in progress.

No Exams in this class. No one makes a living taking tests.

Guidelines for Group Work

Learning how to collaborate is an important life skill in today's world, but it is hard. [The point of collaboration is to produce of higher quality than what we can accomplish alone.](#)

Successful partners:

- Share a vision regarding the quality of work produced.
- Have a clear plan of action. Stick to agreed schedule. Will meet face to face or by phone, etc.
- Share work equitably.
- Respect each other and their contributions. Are honest.
- Communicate: Keep partners updated at all times.
- Complete work early enough to check each other's work and edit before handing it in.
- **DO NOT** partner with your best friend, girlfriend, boyfriend, etc. **Bad idea.**
- **Most, most, most important: Do what they say and get the job done on time.**

Outstanding papers will be a unified product of both partners contributing their best efforts. We will see a wide range of papers in this class – from what looks like last-minute work, to those that rise to the level of professional-quality. It is an amazing difference.

Tech-Related Course Policies and Expectations

You are expected to do your own work: reading assignments, research, and homeworks.

You are responsible for all of your work. If your name appears on the work, you are an author and are responsible for the work. Make sure you approve everything that is turned in on your behalf.

Any work or communication submitted as your own through any form of media, for example: in class, on the course website, or posted on Facebook, must include proper crediting of all sources used. Do not “cut and paste” from text on posts or assignments without proper citation — this is cheating.

Do not multi-task during class. This means no email, text, DM, social media, off-line conversations, sports scores, video games, etc. during class. We can see you. Laptops and mobile devices are allowed only for in-class activities. Abuse of devices may result in requiring devices to be turned in or being asked to leave the room.

You are required to use computers and the internet as part of this course. Technical difficulties are no excuse for unfinished work, there are computers in the library. If you have any issues please see me for help, UH has laptops for loan.

All assignments and postings are due on the dates indicated so that the class can proceed smoothly. Grading

and feedback will be given within two weeks of submission date.

LABORATORY:

Laboratory Sessions

Labs meet once per week starting immediately. There will be 12 sessions when experiments will be performed, one session for discussion of critiques of your animal design projects, and one session mid-semester when each team will deliver a 10-minute oral report on your animal design project.

Laboratory Attendance

Attendance is mandatory and there are no make-up labs. Failure to attend a lab will result in a grade of “zero” for that laboratory report unless you were absent due to health problems and have documentation from a doctor, clinic, or coroner stating why you were unable to attend class. If you are a UH athlete and are going to miss a laboratory due to an athletic event, you must inform your TA and Dr. Butler **AT LEAST TWO WEEKS** before that date. In the case of acceptable absences, arrangements for alternate assignments will be made, as appropriate, and if feasible.

Laboratory Materials

- bound laboratory notebook (composition book is fine)
- closed-toed shoes for labs involving dissection.

Install a free copy (reader version) of the data acquisition software to work on data analysis at home.

Labchart 7.x Reader: <http://www.adinstruments.com/support/software>

Pre-Lab

Prior to lab, (1) read the laboratory protocol with the aim of understanding the main question and techniques used, and (2) come with a **completed** prelab written in your notebook, consisting of: a brief **introduction** and a **materials and methods** section. No credit for incomplete or late Pre-Labs.

Laboratory Roles

Laboratories will be conducted in groups of 3, with roles which rotate each week: (1) The animal handler/test subject, who preps the subject and maintains the prep in good condition throughout the experiment (2) the experimenter, responsible for all aspects of experimental setup and performing the manipulations, and scribe duties, and (3) the computer recorder, who runs the software and ensures that all data are recorded with annotations, and makes sure that the data are saved and distributed to all members. One of you will also be **the project coordinator**, who ensures that everyone knows their roles, works together efficiently and harmoniously, and checks data quality before moving on to the next procedure. **The project coordinator is like the producer on a movie set: responsible for making sure that all tasks are accomplished, and submitting the group’s lab report. The PC does not do all of the analysis nor all of the writing.**

Rather, all group members must contribute to the data collection, analysis, and writing and editing of the report. Each PC earns a “project coordinator score” based on the average score of the **group lab reports** for which he/she was project coordinator.

You will work with the same group all semester starting with lab session 3. Groups will be randomized during the first two laboratory sessions so that people have the opportunity to sample different partners.

Laboratory Reports

There will be a total of 12 laboratory reports: **Nine group reports** and **three individual reports** (see calendar). NOTE: Group reports will be submitted by the Project Coordinator but **must have contributions from each member of the group**, with an official “statement of respective contributions” detailed in the final paragraph of the report. **Lab reports should be 3-5 pages in length**; focus on the main ideas and get to the point quickly. You can go longer if you can’t be more concise, but please work on brevity and getting to the point.

Marguerite's Rules

1. Don't expect me to remember anything you tell me. Seriously. Send me an e-mail, please.
2. A thick skin is required for this class (and a sense of humor)... Writing involves a lot of hard work, and feelings can get frayed if we lose sight of the fact that **we are all trying to help each other to improve.** Remember that kindness and humor can sometimes make the criticism easier to take. Remember to

ALWAYS BE PROFESSIONAL. Try not to hurt, and on the flip side, don't take offense.

3. Effort counts... it's what helps us to improve... and I will definitely be paying attention.
4. Please ask, ask ask, but do your "homework" first. **Make an appointment.** Come prepared with your questions or concerns, and tell me what you've tried before you came to see me. TA's are wonderful sources for help – they are all very good.
5. If can, can, if no can, no can.....
6. I am not your friend. I am not your mother. I am your teacher. I will always do what is best for your learning, not necessarily what you want.
7. Pet peeve alert: Please don't ever call me Miss anything. You may call me Marguerite or Dr. Butler, whatever you feel comfortable with.

You will be expected to conduct yourself in a professional manner. Please be at class on time, silence your cell phone (and anything else that might beep, ring, rap, play music, etc.), and be respectful of your instructor and TAs. Offer criticism kindly and take criticism well. Give your full attention to the class activity.

Cheating, Plagiarism, and Academic Conduct:

Cheating undermines teaching and robs students of the opportunity to learn. Don't do it.

Cheating includes but is not limited to: giving other students copies of your homework, papers, analyses, etc.; obtaining copies of said work by others; using copies of said work or representing any portion of another person's work as your own (i.e., plagiarism). While we encourage you to discuss strategies for problem solving, and even collaborate by working through the problems/strategies together, giving someone all the answers is cheating. If you are unsure please ask.

Plagiarism is when you use information or present ideas, whether by paraphrase or direct quote, from a source (be it published or a classmate) without giving proper credit to that source.

Cheating in any way will be reported to the attention of UH Office of Judicial Affairs.

Cheating will result in an F in this course (both the lab and the lecture).

This course is not repeatable to violators of the academic conduct code.

Remember: Winners never cheat, and cheaters never win. Be a winner.

Further details of the Student Conduct Code can be found at:

http://studentaffairs.manoa.hawaii.edu/policies/conduct_code/proscribed_conduct.php

GRADING:

There will be a lot of points available for you to earn in the course. As shown in the table below ~1/3 your grade will be based on points from lecture-based problem sets, discussions, and quizzes, ~1/3 from laboratory reports, and ~1/3 from the animal design project and oral presentation assignments.

Category	Nu	Points Each	Total Points	Grading Scale	
Lab Work Sheets - Individual	5	20	100		
Laboratory Reports - Group	6	30	180	Points	Grade
Laboratory Reports – Individual	1	60	60	92-100%	A
Laboratory Project Coordinator	1	30	30	90-91.9%	A-
Laboratory Partner Evaluation	7	10	70	87-89.9%	B+
Pre-Lab Quiz	10	5	50	82-86.9%	B
Pre-Lab	10	5	50	80-81.9%	B-
Lecture Problem Sets	6	30	180	77-79.9%	C+
Discussion Partner Evaluation	15	10	150	72-76.9%	C
Quizzes	?	?	100	69-71.9%	C-
Wikipedia Project				67-68.9%	D+
- Exercises	8	5	40	62-66.9%	D
- Peer Reviews	2	10	20	55-61.9%	D-
- Quality of Wikipedia contributions and reflective essay	1	50	50	below 55%	F
Short Design report – primary author	2	30	60		
Short Design report – secondary author	2	10	20		
Design Project Term paper	1	100	100		
Design Projects – partner evaluation	4	10	40		
Peer Review	3	10	30		
Oral Presentations	2	50	100		
TOTAL			1330		

* You will receive the same grade for both 430 and 430L (they are reciprocal co-requisites). Your scores will be rounded to the nearest 0.1%.

* **You must be passing (D- or higher) both the lab and lecture to get an overall passing grade.**

* **NOTE: Effort counts!** If you are on the border, I will use the effort you demonstrate through your work to decide whether to push you over. No effort == no bump up.

Topics we will cover in this class:

Animal Size and Scaling, Metabolism, Heat and Temperature Regulation, Feeding and Nutrition, Digestion, Respiration, Circulation, Muscle, Biomechanics, Locomotion, Ionic and Osmotic Balance, Excretion, Neurons and Synapses, Nervous System Evolution, Sensory Systems, Glands and Hormones, Reproduction, Immune Systems

ANIMAL DESIGN PROJECT:

Assignment

Each pair of students will model four physiological systems and write a **scientific paper** describing the design for one of the physiological systems of an extinct vertebrate. Due dates on calendar. One partner will have primary responsibility for reports 1 and 3, and the other partner for reports 2 and 4. **Both authors are expected to contribute to the research and analysis presented as well as the writing**, but the primary author is responsible for coordinating the tasks, setting the schedule, submitting the initial draft, the final editing and submission of the final draft.

Format

The short report format will be given in class. (this is a new format since dropping the W for lecture).

The final term paper should be approximately 8-10 pages in length, 1" margins on all sides, 12-point font double-spaced. Figures and/or Tables are included in the page length, but References are not. If possible, embed your figures into the text. Papers must include a **Title**, an **Abstract**, **Introduction**, **Results** (written in paragraph form and where you present your findings), **Discussion** (discuss the implications of your results, what they mean and future directions), **Author Contributions** (a brief paragraph describing what each person contributed to the paper), and **References** (*c.f.* Kultz, 2003; min 10 primary literature sources). Page limits are a target, I am more concerned about content rather than length.

**Writing assistance @ the Manoa Writing Center (<http://www.english.hawaii.edu/writingcenter/>). Or make an appointment to see me. I can help.*

Related Components

- **Wikipedia Project** Collect your background info and share it with the world!
- **Four Design project reports.** Clearly state your assumptions based on pertinent literature on the topic, as well as your own analysis and design of the system.
- **Partner evaluation.** Each partner evaluates and grades the other's contributions to the project.
- **Peer-reviews/Grading.** Your review of a colleague's design project paper. You will be assigned one paper to read at each due date. Turn in three copies of your written summary (the peer-review) and score that you feel the paper should receive (one copy to me, one to each of the authors). You will be graded on the quality of your peer-review and grading.

Grading Criteria

The following are criteria for an "A" paper. Papers of lesser quality will be graded accordingly.

- The **content** is judged on mastery of the material and will demonstrate the following: 1) material presented is accurate and convincing (this means that your writing will give the reader will a high degree of confidence that you are correct and we can trust everything including your calculations); 2) deals *completely* and *creatively* with the physiological system in the assignment; 3) major concepts are well integrated demonstrating a thorough understanding on the part of the students; 4) the paper reflects university-level mastery of the material. An "A" paper will provide a physiological insight into the problem (roughly 60%)
- The **organization** is judged on the structure of the paper and will include: 1) a clear and fully developed argument, 2) support for every claim/scientific statement via calculations and/or suitable references, 3) logical and concise overall organization, 4) paragraphs that are constructed to assist concise and orderly flow of ideas, 5) absence of repetition, and 6) a varied range of sentence structure. (20%)
- **Style and grammar:** The paper should read smoothly and clearly, indicating the student's ability to synthesize material from a number of sources into a coherent whole. There are no, or very few, typing errors. There are no significant errors in grammar, spelling or punctuation. (10%)
- **Cited references** are of sufficient quantity and quality for the topic covered, and are appropriately cited and referenced. (10%)

PLEASE NOTE: Rubrics don't convey the message that a poorly written paper will get lower marks on all categories. The writing has to make sense before it can be graded!

CITATIONS in standard scientific format. E.g., http://writing.wisc.edu/Handbook/DocCSE_NameYear.html