



BSC 314 COMPARATIVE VERTEBRATE PHYSIOLOGY

COURSE SYLLABUS: FALL 2025 CRN: 81971

INSTRUCTOR INFORMATION

Instructor: Dr. Walter Paulin Taponjou Nkonmeneck
Course Location: Science Building 122
Office Location: STC 208
Office Hours: MWF 1-2:30 PM (Zoom link or in person)
University Email Address: Walter.Taponjou@etamu.edu
Preferred Form of Communication: **Email**
Communication Response Time: less than 48 hours

COURSE INFORMATION

Textbooks:

- **Recommended:** Animal Physiology, 5th edition by Hill, Cavanaugh, and Anderson. Sinauer Associate, Inc., 2021. ebook ISBN 9780197553619. Casebound ISBN 9780197552438. Loose-leaf print option ISBN 9780197553596
- **Alternative:** Animal Physiology, Fourth Edition, by Hill, Wyse, and Anderson. Casebound: ISBN: 978-1-60535-471-2. Looseleaf (3-hole punched format): ISBN:978-1-60535-594-8

Additional Texts and/or Materials:

Vertebrates : Comparative Anatomy, Function, Evolution. 8th ed. New York: McGraw-Hill. Kardong, K. 2019.

Student will select one of these research articles for their paper analysis assignment (Required readings):

The syllabus/schedule are subject to change.

- Smith, S.M. and Angielczyk, K.D., 2020. Deciphering an extreme morphology: bone microarchitecture of the hero shrew backbone (Soricidae: Scutisorex). *Proceedings of the Royal Society B*, 287(1926), p.20200457. (<https://royalsocietypublishing-org.proxy.bc.edu/doi/10.1098/rspb.2020.0457>)
- Di Santo, V., Kenaley, C.P. and Lauder, G.V., 2017. High postural costs and anaerobic metabolism during swimming support the hypothesis of a U-shaped metabolism–speed curve in fishes. *Proceedings of the National Academy of Sciences*, 114(49), pp.13048-13053. (<https://www.pnas.org/content/pnas/114/49/13048.full.pdf>)
- Boback, S.M., McCann, K.J., Wood, K.A., McNeal, P.M., Blankenship, E.L. and Zwemer, C.F., 2015. Snake constriction rapidly induces circulatory arrest in rats. *Journal of Experimental Biology*, 218(14), pp.2279-2288. (https://jeb.biologists.org/content/218/14/2279?utmsource=TrendMD&utm_medium=cpc&utm_campaign=J_Exp_BiolTrendMD_1)
- Dai Pra, R., Mohr, S.M., Merriman, D.K., Bagriantsev, S.N. and Gracheva, E.O., 2022. Ground squirrels initiate sexual maturation during hibernation. *Current Biology*, 32(8), pp.1822-1828. (https://libkey.io/libraries/1879/articles/519291128/full-text-file?utm_source=api_1183&allow_speedbump=true)
- Storey, K. B., & Storey, J. M. 2017. Molecular physiology of freeze tolerance in vertebrates. *Physiological Reviews*, 97(2), 623-665. (<https://journals.physiology.org/doi/pdf/10.1152/physrev.00016.2016>)
- Piot, E., Picard, B., Badaut, J., Gilbert, C. and Guinet, C., 2023. Diving behaviour of Southern elephant seals: new models of behavioural and ecophysiological adjustments of oxygen store management. *Journal of Experimental Biology*, pp.jeb-245157. (<https://journals.biologists.com/jeb/article-abstract/226/13/jeb245157/323164>)
- Musilova, Z., Cortesi, F., Matschiner, M., Davies, W.I., Patel, J.S., Stieb, S.M., de Busserolles, F., Malmstrøm, M., Tørresen, O.K., Brown, C.J. and Mountford, J.K., 2019. Vision using multiple distinct rod opsins in deep-sea fishes. *Science*, 364(6440), pp.588-592. (https://libkey.io/libraries/1879/articles/309007775/full-text-file?utm_source=api_1183&allow_speedbump=true)
- Miyachi, M., Kawano, H., Sugawara, J., Takahashi, K., Hayashi, K., Yamazaki, K., Tabata, I. and Tanaka, H., 2004. Unfavorable effects of resistance training on central arterial compliance: a randomized intervention study. *Circulation*, 110(18), pp.2858-2863. (<https://www.ahajournals.org/doi/full/10.1161/01.CIR.0000146380.08401.99>)

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Course Description

This course is designed for biology majors with a comprehensive background in the field. It aims to provide students with a solid understanding of basic physiological principles and the functional organization of living systems. The course will focus on the functioning of organ systems across various vertebrate classes and their adaptations to their environments, fostering an appreciation for evolutionary relationships. We will explore mechanisms by which animals perform their life-sustaining functions, examine the evolution and adaptive significance of physiological traits, investigate the similarities and differences among diverse phylogenetic groups of animals, and explore the interplay between physiology and ecology in the present and throughout evolutionary time. Furthermore, we will emphasize the significance of all levels of organization, from genes to proteins, and tissues to organs, in comprehending physiological systems.

Student Learning Outcomes

1. Identify the primary functions of major vertebrate physiological systems and describe the intricate interconnectedness between their functions and structures.
2. Explain how major physiological systems collaborate to maintain homeostasis in challenging environments.
3. Apply basic quantitative skills to interpret physiological data, enabling you to draw inferences about the diversity and function of various vertebrate systems.
4. Recognize and elucidate patterns that unite, organize, and simplify diverse mechanisms of vertebrate physiology.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

- Proficiency in using the D2L Brightspace Learning Management System through myLeo Online.
- Proficiency in the use of Microsoft Word and PowerPoint.
- Other relevant graphics programs for preparing effective PowerPoint presentations.

Instructional Methods

This course meets in-person in the traditional lecture format. You will be required to read the book chapters, supplemental reading material, and instructional PowerPoint slides. Quizzes and exams will cover the material presented to you via myLEO Online and information in the text. I will post announcements on the course homepage to remind students of important due dates, in addition to announcing them in class.

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Students can monitor their progress in the course on the course webpage in D2L Brightspace.

Student Responsibilities or Tips for Success in the Course

- Dedicated study time each week to go over the materials covered in the class and the information in the relevant book chapter(s).
- Regularly checking both myLEO Online (D2L Brightspace) and emails for course-related announcements.
- Completing assignments on time.

GRADING

Final grades in this course will be based on the following scale:

A = 90%-100%, B = 80%-89%, C = 70%-79%, D = 60%-69%, F = 59% or Below

Assessments

You will be assessed based on the grades from the six biweekly mini exams, one paper analysis, the midterm, and final exams. Below is a breakdown of potential grades that can be earned in the class:

Assignments	Max point	Times	Points	Percentage of final grade
Biweekly Mini Exams	30	x6*	150	30%
Paper Analysis	100	x1	100	20%
Midterm Exam	100	x1	100	20%
Final Exam	150	x1	150	30%
Total			500	

* For the Biweekly Mini Exams, the lowest score will be dropped for a total of 5 assignments.

Biweekly Mini Exams

There will be 6 Biweekly Mini Exams (BMEs) worth 30 points apiece and will cover the two previous weeks. The lowest score will be dropped, and the remaining 5 BMEs will count for 150 points. BMEs will be a combination of multiple choice and short answer and are designed to assess your knowledge of physiology and critical analytical abilities. BMEs will be available by Wednesday at 6 p.m. Central time and due the following Sunday at 11:59 p.m. Central time. This will be uploaded in D2L or emailed directly to me (walter.tapondjou@etamu.edu).

No makeup BMEs will be administered unless there's an emergency or a serious, documented illness.

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Paper Analysis

To formulate a deep understanding of a scientific subject, a scientist must become familiar with current research devoted to that topic. This requires a survey of the primary research literature. Reading and interpreting primary research papers is a skill that doctors and scientists alike hone throughout their careers. This assignment introduces a framework that develops these skills and, like so many professional endeavors, it takes patience and practice.

At the end of week 8, you will be asked to assess one of our assigned scientific papers and, via D2L or emailed to me (walter.tapondjou@etamu.edu), answer the following prompts :

1. What is the paper's big question?
2. Summarize the background in 5 sentences or less.
3. Identify the specific questions, i.e., what exactly are the authors trying to answer with their research?
4. Identify the approach, i.e., what are the authors going to do to answer the specific questions?
5. Draw a conceptual diagram of the experiments undertaken in this paper. Include exactly what the authors did and as much detail as you need to fully understand the work.
6. Read the results section. Write one paragraph to summarize the results for each experiment. Don't yet try to decide what the results mean, just write down what they are.
7. Do the results answer the specific question/questions? What do you think they mean?
8. Read the discussion/interpretations/conclusions section. What do the authors think the results mean? Do you agree with them?
9. Now, go back to the beginning and read the abstract. Does it match what the authors said in the paper? Does it fit with your interpretation of the paper?
10. Finally, what do other researchers say about this paper?

Answers to these prompts must be submitted by 11:59 p.m. on Sunday, October 19th.

Midterm and Final Exams

There will be two exams: one midterm exam at the end of week 7, and a final exam (**TBD**) during the Fall 2025 final week (Dec. 6th-12th). Like the BMEs, exams will be a combination of multiple choice and short answer and designed to simultaneously assess your knowledge of physiology and critical analytical skills. Thus, BMEs will be good practice for the exams.

The final exam will cover material studied after the second midterm and include a 50-point section of more synthetic questions that ties in a number of concepts and systems studied throughout the course. In this small way, a portion of the final can be thought of as cumulative.

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Makeup Policy

The student is responsible for requesting a makeup exam when they are unable to attend the regularly scheduled examination and must schedule the makeup exam within 2 days of the absence. Makeup exams will be scheduled only in the event of an EXCUSED absence (as defined in the Student's Guidebook). If the test is not made up, the student will receive a zero for that exam.

Extra credit

The student survey on the 1st day of class is your guaranteed way of earning extra credit. Student survey will consist of answering a few questions on small cards on the first day of class. It is worth 10 points and will be used as extra credit points toward the final grade.

There will be an optional opportunity to receive extra credit for attending a seminar presentations on-campus. More details regarding these will be provided later in the semester.

Tentative Course schedule: *(adjustments may be made later at instructor's discretion)

Week	Date	Topic	Heads up	Relevant text Chapters
1	25-Aug	Welcome/Introduction	Student survey 1st day of class	Chapter 1
	27-Aug	Homeostasis		Chapter 1
	29-Aug	Homeostasis & Plasticity		Chapter 1 & 4
2	1-Sep	Labor Day		
	3-Sep	Homeostasis & Plasticity		Chapter 1 & 4
	5-Sep	Thermoregulation	Mini Exam 1	Chapter 10 & 11
3	8-Sep	Thermoregulation		Chapter 10 & 11
	10-Sep	Thermoregulation		Chapter 10 & 11
	12-Sep	Metabolism & Body size		Chapter 7 & 8
4	15-Sep	Metabolism & Body size		Chapter 7 & 8
	17-Sep	Excitable cells		Chapter 2, 12 & 13
	19-Sep	Excitable cells	Mini Exam 2	Chapter 2, 12 & 13
5	22-Sep	Sensory systems		Chapter 14
	24-Sep	Sensory systems		Chapter 14
	26-Sep	Nervous regulation		Chapter 15
6	29-Sep	Nervous regulation		Chapter 15
	1-Oct	Nervous regulation	Mini Exam 3	Chapter 15
	3-Oct	Effectors, muscles		Chapter 19, 20 & 21
7	6-Oct	Effectors, muscles		Chapter 19, 20 & 21
	8-Oct	Effectors, muscles		Chapter 19, 20 & 21
	10-Oct	Midterm Exam		
8	13-Oct	Endocrine regulation		Chapter 2 & 16
	15-Oct	Endocrine regulation		Chapter 2 & 16
	17-Oct	Endocrine regulation		Chapter 2 & 16
9	20-Oct	Circulation & Blood	Paper Analysis due Oct 19th	Chapter 22, 25 & 26

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	22-Oct	Circulation & Blood		Chapter 22, 25 & 26
	24-Oct	Circulation & Blood	Mini Exam 4	Chapter 22, 25 & 26
10	27-Oct	Ventilation, gas exchange		Chapter 22, 23 & 24
	29-Oct	Ventilation, gas exchange		Chapter 22, 23 & 24
	31-Oct	Ventilation, gas exchange		Chapter 22, 23 & 25
11	3-Nov	Exercise Metabolism		Chapter 9, 7 & 26
	5-Nov	Exercise Metabolism		Chapter 9, 7 & 26
	7-Nov	Exercise Metabolism	Mini Exam 5	Chapter 9, 7 & 26
12	10-Nov	Osmoregulation		Chapter 2, 3, 27 & 28
	12-Nov	Osmoregulation		Chapter 2, 3, 27 & 28
	14-Nov	Osmoregulation		Chapter 2, 3, 27 & 28
13	17-Nov	Excretion		Chapter 2, 3, 29 & 30
	19-Nov	Excretion		Chapter 2, 3, 29 & 30
	21-Nov	Digestion & Nutrition		Chapter 2, 3, 5 & 6
14	24-Nov	Digestion & Nutrition	Mini Exam 6	Chapter 2, 3, 5 & 6
	26-Nov	No class		
	28-Nov	Thanksgiving Break		
15	1-Dec	Final Exam Review		week 1-7
	3-Dec	Final Exam Review		week 8-14
	6th-12th Dec	Final Exam	Final Exam	

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TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

Zoom Video Conferencing Tool

https://inside.tamuc.edu/campuslife/CampusServices/CITESupportCenter/Zoom_Account.aspx?source=universalmenu

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

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Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

<https://community.brightspace.com/support/s/contactsupport>

Interaction with Instructor Statement

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.

<https://inside.tamuc.edu/admissions/registrar/documents/studentGuidebook.pdf>.

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:

<https://www.britannica.com/topic/netiquette>

TAMUC Attendance

For more information about the attendance policy please visit the [Attendance](#) webpage and [Procedures 13.99.99.R0.01](#)

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

[Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

The syllabus/schedule are subject to change.

[Undergraduate Student Academic Dishonesty Form](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/documents/13.99.99.R0.03UndergraduateStudentAcademicDishonestyForm.pdf>

Graduate Students Academic Integrity Policy and Form

[Graduate Student Academic Dishonesty Form](#)

<https://inside.tamuc.edu/aboutus/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10.pdf>

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce

Velma K. Waters Library Rm 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: studentdisabilityservices@tamuc.edu

Website: [Student Disability Services](#)

<https://www.tamuc.edu/student-disability-services/>

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

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Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

A&M-Commerce Supports Students' Mental Health

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit www.tamuc.edu/counsel

Mental Health and Well-Being

The university aims to provide students with essential knowledge and tools to understand and support mental health. As part of our commitment to your well-being, we offer access to Telus Health, a service available 24/7/365 via chat, phone, or webinar. Scan the QR code to download the app and explore the resources available to you for guidance and support whenever you need it.

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<http://telusproduction.com/app/5108.html>

AI use policy [Draft 2, May 25, 2023]

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

13.99.99.R0.10 Graduate Student Academic Dishonesty