

Advanced Comparative Animal Physiology

The University of Toledo
College Of Natural Sciences and Mathematics

BIOL 5230

Instructor:	John Plenefisch	Term:	Spring 2017
Email:	john.plenefisch@utoledo.edu	Class Location/Times:	Online
Office Phone:	419 530-7840	Course Website:	Blackboard Learn

COURSE/CATALOG DESCRIPTION

The comparative and environmental physiology of vertebrates and invertebrates including metabolism, temperature regulation, respiration, circulation, excretion and osmotic regulation.

COURSE OVERVIEW

Physiology is that part of Biology that deals with understanding the normal functions of living organisms and their constituent parts: how organs and organ systems function in the context of the whole organism. In animals physiology is often conceptually broken down into integrated functions associated with specific organ systems. In this course we will examine 1) metabolism, including thermal regulation and nutrient procurement, 2) systems that co-ordinate and integrate the animals activities, with a focus on the nervous and endocrine systems, 3) movement with a focus on muscle, 4) gas exchange and internal transport, including the respiratory and circulatory systems, and 5) water balance, salt homeostasis and waste elimination with a focus on the excretory system.

STUDENT LEARNING OUTCOMES:

Upon successful completion of this course, you will be able to:

1. Describe how homeostasis in organisms emerges from the properties of cells and their constituent molecule
2. Describe nutrient procurement, energy metabolism and thermal regulation in animals.
3. Describe the structure and function of the nervous system
4. Describe the fundamentals of the endocrine system at the systemic level.
5. Describe the structure and function of the musculo-skeletal system
6. Describe the structure and function of the respiratory system
7. Describe the mechanisms of internal transport and regulation in various organisms.
8. Describe the control of water balance, salt homeostasis and waste elimination

TEACHING STRATEGIES

This fully online course is designed to stimulate student learning through the web-based delivery of readings, video, and audio, as well as collaborative activities involving asynchronous discussion. No on-campus meetings will be required.

PREREQUISITES

Permission of Instructor, BIOL 6830 or the equivalent is recommended.

TECHNICAL SKILLS

To succeed in this course, it will be important for learners to possess the following technical skills:

1. Rename, delete, organize, and save files.
2. Create, edit, and format word processing and presentation documents.
3. Copy, paste, and use a URL or web address.
4. Download and install programs and plug-ins.
5. Send and receive email with attachments.
6. Locate and access information using a web search engine.
7. Use a learning management system.

REQUIRED TEXT

Animal Physiology, 4th Edition (2016) R. Hill, G. Wyse, M. Anderson. ISBN-13: 978-1-60535-471-2. You are welcome to use the earlier 3rd edition, however all pages and chapters given in the schedule and modules refer to the 4th edition. If you choose to use the earlier edition it is your responsibility to ensure you are reading the equivalent material in the earlier edition.

TECHNOLOGY REQUIREMENTS:

Browser Check Page

Students need to have access to a properly functioning computer throughout the semester. [The Browser Check Page](#) will enable you to perform a systems check on your browser, and to ensure that your browser settings are compatible with [Blackboard](#), the learning management system that hosts this course.

Software

Student computers need to be capable of running the latest versions of plug-ins, recent software and have the necessary tools to be kept free of viruses and spyware. The computer needs to run the following software, available in the [Learning Ventures Download Center](#).

- Word Processing Software
- Adobe Acrobat Reader
- Apple QuickTime Player
- Java Plugin Console
- Adobe Flash Player
- Adobe Shockwave Player
- Mozilla Firefox Browser - Recommended

Internet Service

High-speed Internet access is recommended as dial-up may be slow and limited in downloading information and completing online tests. This course does contain streaming audio and video content.

Use of Public Computers

If using a public library or other public access computer, please check to ensure that you will have access for the length of time required to complete tasks and tests. A list and schedule for on-campus computer labs is available on the [Open Lab for Students](#) webpage.

UT Virtual Labs

Traditionally, on-campus labs have offered students the use of computer hardware and software they might not otherwise have access to. With UT's Virtual Lab, students can now access virtual machines loaded with all of the software they need to be successful using nothing more than a broadband Internet connection and a web browser.

The virtual lab is open 24/7 and 365 days a year at [VLAB: The University of Toledo's Virtual Labs](#).

TECHNOLOGY PRIVACY POLICIES

This course will use tools that will require learners to create an account with a username and password. To safeguard your account on each platform, please make note of the following privacy policies:

- [UT IT Responsible Use Policy](#)

COURSE POLICIES

Policy Statement on Academic Dishonesty

Academic dishonesty will not be tolerated. Please read [The University's Policy Statement on Academic Dishonesty](#).

Copyright Notice

The materials in the course website are only for the use of students enrolled in this course for purposes associated with this course, and may not be retained or further disseminated.

GRADING POLICIES

Specific guidelines and grading criteria will be provided with each assignment. Grades and instructor feedback for each assignment will be posted to the Grade Book within one week, if not earlier, after each assignment has been completed.

Assignments/Assessments	Total Points	% of Final Grade
Online Discussions	160	40%
Problem Sets	160	40%
Quizzes (7 total)	80	20%
Total	400	100%

Learners are expected to complete and submit all assignments and quizzes by the due date listed in the Course Schedule. Late assignments will not be permitted unless arrangements are discussed and approved well before the required due date. Ask questions as soon as possible by email or by phone if you do not understand an assignment.

The grading scale for this course is as follows:

- A = 90 – 100%
- B = 80 – 89%
- C = 70 – 79%
- D = 60 – 69%
- F = < 59%

AMERICANS WITH DISABILITIES ACT

The Americans with Disabilities Act (ADA) requires that reasonable accommodations be provided for students with physical, sensory, cognitive, systemic, learning, and psychiatric disabilities. In accordance with the ADA and university policy, if you have a documented disability and require accommodations to obtain equal access in this course; please contact the instructor at the beginning of the semester to discuss any necessary accommodations. Please contact the [Office of Student Disability Services](#) for verification of eligibility at 419-530-4981 (voice) or 419-530-2612 (TDD).

GENERAL ACCESSIBILITY STATEMENT ON COURSE TECHNOLOGY

In conjunction with The University's commitment to ensuring equal access to all technology-based information, this course contains technologies that learners can use regardless of age, ability or situation. The course's platform, [Blackboard Learn](#), is a certified web-accessible platform, satisfying Level AA conformance criteria of Web Content Accessibility Guidelines (WCAG 2.0). External sites used in the course, such as [Echo360](#), are compliant with Section 508 standards, and the media players used in the course support closed captioning, are keyboard operable, and compatible with screen reading software.

If any accommodations, beyond what is provided, are needed for equal access to any of this course content, please contact the instructor as soon as possible. The University of Toledo's [Office of Student Disability Services](#) processes closed captioning requests for videos and other media from the instructor, which may take up to four (4) business days to complete.

COMMUNICATION GUIDELINES

Email:

Students are expected to check their UT email account frequently for important course information. This class is being taught for you, so if you are having trouble understanding any aspect of it, please let me know. I am here to help, and will do my best to respond to email within 24 to 48 hours.

Discussion:

In this fully online course, participation is vital to your success, and your active engagement during weekly discussion is crucial to learning. Within each module, discussion prompts will be posted in the discussion folder. To earn full credit, you must reply to the initial prompt by 11:59 PM on the date noted and respond to the postings of three of your peers by the 11:59 on the discussion due date. Please see the *Grading Rubric for Online Discussions* for complete grading criteria. The course instructor will also participate in these spaces.

Please note: In the Discussion folder is also a link to Course Questions Discussion Board: this is where you can post questions on the readings or other class materials for clarification. I encourage you to use this venue if you have any questions about the course content: in this way both I and your peers can discuss and clarify difficult or obscure points. I will respond to discussion questions within 24 to 48 hours

Netiquette:

It is important to be courteous and civil when communicating with others. Students taking online courses are subject to the communication regulations outlined in the Student Handbook. To ensure your success when communicating online, take time to familiarize yourself with the "dos" and "don'ts" of [Internet etiquette](#).

TECHNICAL SUPPORT

****If you encounter technical difficulties with Blackboard, please contact the [Learning Ventures Help Desk](#)**** at (419) 530-8835 or utdl@utoledo.edu. The Help Desk offers extended hours in the evenings and on weekends to assist students with technical problems. When calling after hours, leave a detailed message, including your Rocket Number and phone number, and an Learning Ventures staff member will respond on the next business day.

****Technical questions related to on-campus Internet access, virtual labs, hardware, software, personal website hosting, and UTAD account management can be directed to UT's [IT Help Desk](#)**** at (419) 530-2400 or ithelpdesk@utoledo.edu.

LEARNER SUPPORT

The University of Toledo offers a wide range of academic and student support services that can help you succeed:

eTutoring Services

[The Ohio eTutoring Collaborative](#), in partnership with The University of Toledo, now provides online tutoring support for all UT students. eTutoring Services are offered in a wide array of subjects, including Writing, Math, Calculus, Statistics, Accounting, Biology, Chemistry, and Anatomy and Physiology.

eLibrary Services Portal

The [eLibrary](#) is a customized gateway to UT Libraries for online students. It was designed to help you locate the best online library resources without leaving Blackboard.

Student Disability Services

[Student Disability Services](#) provides accommodations and support services to students with disabilities.

Counseling Center

[The Counseling Center](#) is the university's primary facility for personal counseling, psychotherapy, and psychological outreach and consultation services. The Counseling Center staff provide counseling (individual and group), mental health and wellness programming, and crisis intervention services to help students cope with the demands of college and to facilitate the development of life adjustment strategies.

Services for Online Students

Knowing what to do, when to do it, and who to contact can often be overwhelming for students on campus - even more so for distance learners. Visit the [Resources for Current Students](#) webpage to learn more about the wide range of services for online students.

COURSE SCHEDULE (Preliminary):

In this fully online course the topics are broken down into specific "Modules" that focus on common aspects of physiology, each module corresponding to one of the overarching learning outcomes. The modules will loosely align with the 16 weeks of this course, and while each module will take approximately 2 weeks to complete, some modules are by nature shorter and some longer. We will try to adhere to this schedule as closely as possible, but I must reserve the right to modify it according to the pace of our class. Modules will be available beginning on Sunday night of the week we begin the module, and assignments (with the exception of quizzes) within the module will not be due until Saturday night. Once the course site is open, please direct general questions about the content or deadlines to the Course Questions forum under Class Discussion, or you can email me directly.

Module	Topic	Tentative dates	Readings in Hill, et al. 4 th edition	Aligns with learning outcome
Module 1	Introduction, Homeostasis and negative feedback	Jan 9	Ch 1	1a
	Cells and tissues	Jan 10	Ch 2: 34-44	1b
	Biological Molecules: Enzymes	Jan 12	Ch 2: 45-58	1c
	Biological Molecules: Signals	Jan 14	Ch 2: 62-68	1d
	Transport of Solutes and Water: Diffusion, Active Transport	Jan 17	Ch 5: 103-121	1e, 1f, 1g
	Transport of Solutes and Water: Osmosis	Jan 19	Ch 5 : 122-127	1f, 1g
	Module 1 Discussion and Problem Set Due	Jan 21		
Module 2	Nutrition and feeding	Jan 24	Ch 6: 131-152	2a, 2b
	Digestion	Jan 26	Ch 6: 152-163	2c
	Energy Metabolism: Metabolic rates	Jan 28	Ch 7	2d, 2e
	Quiz 1 (Metabolic rates) Due	Jan 28		
	ATP production mechanisms aerobic and anaerobic	Jan 31	Ch 8: 189-199	2f
	ATP production in Exercise physiology	Feb 2	Ch 8: 199-212	2g
	Energetics of Aerobic Activity	Feb 4	Ch 9	2d
	Quiz 2 (ATP production) Due	Feb 4		
	Thermal Regulation in ectotherms	Feb 7	Ch 10: 233-259	2h
	Thermal regulation in endotherms	Feb 9	Ch 10: 259-284	2h
Module 2 Discussion and Problem Set Due	Feb 11			
Module 3	Neurons and nervous systems: Resting potential	Feb 14	Ch 12: 305-319	3a, 3b
	Action potentials	Feb 16	Ch 12: 320-335	3c
	Synapses: Basic principles	Feb 18	Ch 13: 337-351	3d
	Quiz 3 (Resting and Action Potentials) Due	Feb 18		
	Synapses: Neurotransmitters, Receptors and Plasticity	Feb 21	Ch 13: 351-367	3d
	Sensory systems: mechanosensation	Feb 23	Ch 14: 369-382	3e, 3f
	Sensory systems: chemosensation	Feb 25	Ch 14: 383-391	3e, 3f
	Sensory systems: photo-sensation and visual systems	Feb 28	Ch 14: 391-404	3e, 3f

	Quiz 4 (Sensory systems) Due	Feb 28		
	Nervous system organization in vertebrates	Mar 2	Ch 15: 407-420	3h, 3i
	Module 3 Discussion and Problem Set Due	Mar 4		
Spring Break Week March 5-11				
Module 4	Endocrine system: principles and control (including the pituitary)	Mar 14	Ch 16:429- 441	4a, 4b
	Endocrine system: stress response, nutrient metabolism and salt and water balance, and calcium balance	Mar 16	Ch 16: 442-454	4c, 4d, 4e
	Pheromones and Insect Metamorphosis	Mar 18	Ch 16: 455-462	4d
	Quiz 5 (Endocrine System) Due	Mar 18		
	Reproduction and reproductive cycles in animals	Mar 21	Ch 17:465-479	4f
	Hormonal control of vertebrate reproduction in placental mammals	Mar 23	Ch 17: 480-495	4g
	Module 4 Discussion and Problem Set Due	Mar 25		
Module 5	Control of movement	Mar 28	Ch 19; 515-521	5a
	Skeletal muscle function	Mar 30	Ch 20: 537-545	5b
	Muscle energetics, neuronal control and non-skeletal muscles	Apr 1	Ch 20: 545-562	5a, 5c
	Module 5 Discussion and Problem Set Due	Apr 1		
Module 6	Gas Exchange in Animals: diffusion and convection	Apr 4	Ch 22	6a
	Respiration physiology in vertebrates (fish, amphibians and mammals)	Apr 6	Ch 23:599- 622	6b, 6c
	Quiz 6 (Respiration) Due	Apr 8		
	Respiration physiology in birds and invertebrates	Apr 11	Ch 23: 622-633	6c, 6d
	Transport of O ₂ and CO ₂ in the blood	Apr 13	Ch 24: 635-652, 659-665	6e, 6f
	Module 6 Discussion and Problem Set Due	Apr 15		
Module 7	Circulatory Systems: Cardiac cycle and flow in vascular systems	Apr 18	Ch 25: 667-678	7a, 7b
	Circulatory Systems: Open and closed systems, capillary beds	Apr 20	Ch 25: 679-699	7c, 7d
	Module 7 Discussion and Problem Set Due	Apr 22		
Module 8	Water and Salt Physiology (Osmoregulation)	Apr 25	Ch 27	8a
	Osmoregulation in aquatic animals	Apr 27	Ch 28: 741-762	8a
	Osmoregulation in land animals	Apr 29	Ch 28: 763-777	8a, 8d
	Quiz 7 (Water and Salt physiology)	Apr 29		

Kidney function and waste excretion: amphibians and mammals	May 2	Ch 29: 779-802	8b, 8c, 8d
Kidney function and waste excretion: fish and invertebrates, nitrogen excretion	May 4	Ch 29: 802-812	8c, 8f
Module 8 Discussion and Problem Set Due	May 6		