

INTRODUCTION TO ANIMAL PHYSIOLOGY -- BIOL 3250

COURSE SYLLABUS

FALL, 2013

INSTRUCTOR: DR PHILIP HICKS

OFFICE:	Regional Centre, Room 0009D
OFFICE HOURS:	9:00-10:00 Mon & Thursday;
OFFICE PHONE:	766-7136 (leave a message if there's no answer; please speak loudly, slowly and clearly enough for your message to be understood)
E-MAIL ADDRESS:	phicks@lakeheadu.ca (school e-mail address)
WEB PAGE:	http://mycoursecalendar.lakeheadu.ca/pg141.html
CLASS HOURS:	1600-1730 hrs Mon & Wed AT1005
LAB HOURS:	0830-1130 hrs Tues CB3012

A. DESCRIPTION

This course is a survey approach to the field of study of physiology. As physiology is a subdiscipline within the science of biology, there is a laboratory component that is a required element. Since there are a multiplicity of specialised subfields within physiology, emphasis will be placed on only the major areas relevant to a survey course. Students who wish to have a deeper appreciation of homeostasis as a central principle of biology will value this course, as will students who are thinking of pursuing a post-graduate specialisation in one of the life sciences. Many students looking to pursue a career in one of the medical, dental, or veterinary specialties, or some other life sciences discipline will also wish to take this course. It is an exploratory, first course in animal physiology that takes a comparative approach when possible. The course is not concerned with any plant fields of study: the content is restricted entirely to animal physiology. An additional, more specialised course in animal physiology can be taken in the winter semester to obtain a complete and comprehensive overview of the discipline of physiology (Biol 3251).

Offering: 3-3; 0-0

Note: Students who have previous credit in Biology 2030 may not take Biology 3250 or 3251 or 3253 for credit. An additional fee may be required for this course.

B. ORGANIZATION

This is a lecture-lab course; topics are presented by the instructor in sequence according to subject area but where possible common themes will emerge and at those time will be so identified. You won't be required to possess in-depth mathematical knowledge beyond elementary statistics. Lab sessions are offered at regular intervals within the semester. The grading system is outlined below. Biol 3250 students generally are expected to come to class already possessing knowledge at the introductory level of animal tissues and cell structures, membranes, and basic chemistry.

C. COURSE OBJECTIVES

To introduce students to:

1. issues central to various sub-fields comprising animal physiology.
2. various concepts involving homeostatis and response to environmental stimulation.
3. experimental technique in a laboratory setting pertinent to a specialisation in biology.
4. ...and, to provide students with opportunities to observe physiological responses to external stimulation.

D. COURSE TOPICS

The course will cover the following topics, time and weather permitting:

1. History; development of field; unifying principles in physiology (e.g., homeostasis)
2. Cellular basis of physiology
3. Chemistry, biochemistry and cytology of intra- and intercellular communication
4. Neuronal signalling, conduction and operation of synapses
5. Electrical and pharmacological operations of neurons
6. Sensory systems
7. Organisation of the two nervous systems.
8. Learning and memory systems of the brain
9. Motor patterning
10. Neuromuscular junction anatomy and muscle function
11. Actin and myosin; sliding filaments, regulation of contraction and muscle diversity
12. Muscle fibre types, energy metabolism, perfusion
13. Locomotion and skeletal systems; translating contraction into movement; moving in the environment
14. Endocrinology, hormones and regulated behaviours
15. Circulatory and respiratory systems
16. Function and control of cardiac systems
17. Blood and respiratory pigments
18. Respiratory diversity in water and air
19. Gas transport in tissues
20. Thermobiology; thermal strategies (ectothermy, coping with changing body temperature & endothermy, controlling body temperature in changing environments)

E. TEXT AND REQUIRED SUPPLIES

1. Required text: *Principles of Animal Physiology*, by Christopher D. Moyes & Patricia M. Schulte
2. Supplies: Laboratory Manual available as a PDF or by purchase from the Bookstore.

F. GRADING PLAN

Coursework will be weighted as follows:

1. *Lab participation/write-up	5% X 3	15%		
2. *Lab quizzes	5% X 3	15%		
3. Mid-term exam			25%	
4. Final exam			_____	_____
				<u>45%</u>
			30%	+ 25% + 45% = 100%

*LABORATORY REPORTS:

Lab Coordinator: The laboratory Co-ordinator is Mr. Michael Moore, CB-3011A; 343-8909.

There will be 3 laboratory exercises:

- 1/ pH and buffers (Sept 24);
- 2/ earthworm action potential demonstration with neuron/synapse slides (Oct 15), and
- 3/ cell membrane permeability (Nov 5).

Participation in each laboratory session is mandatory. Each laboratory exercise will be written up as a formal report in accordance with the overall direction and style of the Canadian Journal of

Zoology. For purposes of training in modern-day data presentation, computer generated tables and figures are authorised but are not compulsory. The laboratory reports will be graded and will comprise 15% of the final grade (refer to grading scheme, above). Written-up, formal lab reports will be due at the *beginning* of the next scheduled laboratory period. The last report will be due in the office of the Laboratory Co-ordinator on or before 28 November, 2013 unless you are specifically told otherwise. A short quiz on each lab will be made available to you once you have completed all elements of the laboratory exercise assigned. Completed quizzes will be handed in to the Lab Co-ordinator before you leave the lab.

If you are absent from the laboratory when a lab exercise takes place, you will score zero for the two graded elements comprising that exercise: i.e., zero for the quiz missed, plus zero for the lab formal write-up. No make-up quiz or report hand-in will be allowed. Exceptions to this policy will be granted only in the cases of a verifiable medical emergency directly relating to you, or a personal reason, disclosed to and accepted by the instructor. An "acceptable" excuse for an absence is only one which is judged so by the instructor. Examples of allowable reasons for missing a lab exercise are a death in your immediate family or a legal issue that required your presence in a court of law. Such exceptions will always be accompanied by a written "excuse" submitted on professional letterhead. In the case of an allowable absence, the instructor may decide to apply the missing grade(s) to the final, with an appropriate scoring percentage adjustment.

QUIZZES:

There will be a quiz comprising several questions, requests to draw diagrams, etc., provided to you when you feel you have completed all components of the assigned laboratory exercises; three such quizzes will be given to you, one per lab. You must complete the quiz in its entirety without referring to the laboratory materials or communicating with any classmate, or consulting your notes or textbook. Completed quizzes will be handed in to the Lab Co-ordinator before you leave the lab. If you forget to hand in the quiz and leave the lab even for a few minutes, you will receive zero for that assessment.

FINAL EXAM:

The final exam will be comprehensive. It will be given during the final exam regular schedule, as assigned by the University Registrar.

Absences from an exam will be allowed only for which a medical or court excuse is provided (professional letterhead required).

ATTENDANCE:

Formal records of student attendance in class or labs will not be taken, although the Lab Co-ordinator may keep his own records of students who are present. Your attendance in class and at each lab is expected. I will not issue my course lecture notes to any student at any time. Your exam questions will be set based upon topics presented in my classes and on what is said in the lectures. Lab quizzes will cover material dealt with in the lab on that same day. While lectures are loosely based on the material provided in the text book, I diverge from time to time from the book, to go into greater depth on certain topics I consider of relatively greater importance. Therefore being in class during those times would most likely be beneficial to your grade, as exam questions can derive from a combination of lectured material and text-based information.

GENERAL:

Laboratory grades (from quizzes and reports) will be made available for your review on the D2L system (website will be provided). Likewise, your mid-term grade will appear on the D2L site. I recommend that you do remember to *keep all lab reports and the mid-term returned to you* so that any discrepancies can be easily and fairly straightened out. Except in cases of actual error, confirmed at a time of an appeal, final grades will be permanent. The last eligible day to withdraw from the course is Monday, November 04, 2013.

G. CLASSROOM RULES OF CONDUCT

1. No radios, iPods or computer-like/noise-making, hand-held devices are allowed in class.
2. Do not bring food or beverages to the classroom unless it/they are kept inside a closed backpack or similar closable carrying object. This includes plate lunches, drinks, candy of any type, etc., whether opened or not. Open or even visible wrapped food or drinks containers are a sensory distraction to your classmates.
3. Laboratory time is expected to be spent in lab work. Lab time is not free time. Attendance and concerted work on assignments are required elements of all labs.

H. EMERGENCY PROCEDURES

1. Evacuation procedures -- see instructions posted on the campus website..
2. First aid kit -- located in Room CB3011. This room is always left open.
3. Emergency ambulance -- from any instructor's or staff person's office phone, call "9" to get an outside line, then "911." There are phones on other floors, at the bookstore, the health services office on the ground floor, and at many other public access campus locations.
4. Campus security – emergency phone is "8911". It's manned 24/7.

I. YOUR IDEAS, EVALUATIONS, ETC.

In general, your ideas, comments, suggestions, questions, grade challenges, etc. are welcome. Your discretion in these matters is expected, however. No part of your grade will be based on anything other than your coursework and laboratory participation including quizzes.

You are encouraged to take advantage of instructor office hours for help with coursework or anything else connected with the course and your progress.

J. SUGGESTIONS FOR SUCCESS

For most students, particularly those with some science background in cell biology or biological chemistry, this will not be a "difficult" course.

TENTATIVE SCHEDULE

DATE	DAY	PLANNED-FOR (i.e., POSSIBLE) LECTURE TOPICS, BY DATE
SEP 9	MON	1/ Introduction to the course; Q&As, Key concepts in animal physiology: history, homeostasis, control and regulation. physics and chemistry fundamentals
11	WED	2/ Cellular basis of physiology. Prokaryotes and eukaryotes
16	MON	3/ Biochemistry, membranes, ion flow across membranes (diffusion and gradients, voltages from ions)
18	WED	4/ Neuron & glia fundamentals; structure and function; Begin electrophysiology

23	MON	5/ Ion flow, action potential, chemical synapse. Passive vs. active conduction. Voltage gating vs ligand-gating. Chemical messengers and their receptors. Part-1
25	WED	6/ Ion flow, action potential, chemical & electrotonic synapses. Passive vs. active conduction. Voltage gating vs ligand-gating. Chemical messengers and their receptors. Part-2
30	MON	7/ Transmitters, their receptor agonists and antagonists; ionic vs metabotropic processing
OCT 2	WED	8/ Three basic sensory systems: from receptor to cognition, bilaterally (smell, taste, balance)
7	MON	9/ Three more sensory systems: from receptor to cognition, bilaterally (equilibrium, audition, mammalian vestibular apparatus, vision)
9	WED	10/ PNS & CNS. Higher brain processing
14	MON	---- Thanksgiving Day --- University Closed ---
16	WED	11/ ---- Mid Term Exam----
21	MON	12/ Learning and memory as models for CNS; Motor patterning; spinal reflexes and planned movements
23	WED	13/ Molecular Basis of Movement: Fundamental processes including μ tubules/tubulin, μ filaments/actin, myosin, Ca^{2+} , sliding filaments, sarcomere, troponin, tropomyosin.
28	MON	14/ Properties of and needs of muscle; how it works (n.m.j., motor system structure, remaining molecular-level bases of contraction)
30	WED	15/ Energy requirements for muscle, its sources and hormonal regulation; blood perfusion to muscles in need (vasodilation). Comparative aspects of locomotion.
NOV 4	MON	Review/read forward (no class)
6	WED	16/ Hypothalamo-hypophysial axis and its role in endocrinological functions.
11	MON	17/ Circulatory fluids (blood and interstitial fluid, including lymph).
13	WED	18/ Different hearts: structures and functions of cardiac systems
18	MON	19/ Cardiovascular & cardiopulmonary systems: control & regulation
20	WED	20/ Cardiopulmonary interfaces – Part 1
25	MON	21/ Cardiopulmonary Interfaces – Part 2
27	WED	22/ Temperature Regulation Strategies
DEC 02	MON	Study day (Left unscheduled for leeway re: class cancellations/ including possible review/Q&A session, if time permits)