

BIOB34 - Animal Physiology (Summer 2013) – Outline/Syllabus

Lecturer: Dr. A.J. Elia, Campbell Family Institute for Breast Cancer Research (CFIBCR) /University Health Network (UHN), Dept. of Biophysics, University of Toronto.

Email: aj.elia@utoronto.ca – You MUST use a “*.utoronto.ca” account when emailing me, the TA, or course admin (see below).

Office hours: by appointment before or after lecture (email me to let me know you are coming); SW110 or SW540B. You can make an appointment at lecture to see me (or email to arrange a time) – usually 5-7pm Wednesday.

TA: Cindy Bongard, bongard@utsc.utoronto.ca

T.A. Office Hours: Email (bongard@utsc.utoronto.ca) to arrange a time to meet her.

Coarse Coordinator: Angela Jiang (ajiang@utsc.utoronto.ca); 416-287-7404. If you should miss a quiz, test, or exam, please see Angela with appropriate paperwork.

Guest Lecturers: These lectures provide a chance for students to see firsthand how some of the principles and techniques discussed in class are applied to current research questions in Physiology. Material they present may be examined in term tests and/or the final exam.

Lectures: Wednesdays 7:00pm-9:00pm; Location: Science Wing 110. **Tutorials:** Wednesday 9-10pm (schedule shown on next page).

Marking Scheme (tentative – to be finalized by the 2nd lecture):

Tutorial Quiz 1: 10% (May 29, 2013) (Assignment #1 has 92 questions based on Ch2; 30 will be changed slightly and used to make up Quiz 1)

Mid-Term Test: 25% (June 26, 2013)

Assignment 2: 10% (July 10, 2013) – hand in tonight (5 well constructed multiple choice questions from the assigned reading(s))

Tutorial Quiz 2: 10% (July 24, 2013)

Final Exam: 45%, cumulative. (Monday, August 12 - Tuesday, August 30, 2013)

NOTE 1: You may choose (and I encourage this) to work together in small groups when doing Assignment #1. Let me know if I can help by posting something on Blackboard. Assignment #2 must be done individually (i.e., each person needs to hand in 5 multiple choice questions with answers). CAREFUL, do NOT plagiarize.

NOTE 2: SEE “www.utsc.utoronto.ca/registrar” for important dates (like, the last day to drop a “Y” COURSE WITHOUT academic PENALTY and have them removed from transcript is Monday, July 22, 2013....)

NOTE 3: THAT READING WEEK IS Tuesday, June 18 – Saturday June 22; therefore, no class June 19 (finish your Assignment #2). The mid-term test falls the Wednesday after reading week (Jun 26th).

General *re.* Grading

The tutorial tests and mid-term test will be primarily a multiple-choice format (scantron), but *may* also include some short answer questions. The final exam will be cumulative, including material from the entire course. The final exam will be multiple-choice, scantron. Questions will be made from material covered in lecture and assigned textbook readings.

SPECIAL NOTE: There are no makeup tests - if the term test (or a tutorial test) is missed, you will receive a zero, unless there is a valid medical (verifiable) reason (UofT has special forms to fill out). Please see Angela Jiang if you miss a test. If there is a valid reason for missing the mid-term test (or tutorial test), then weight from the missed test will be transferred to the final exam weight. For example, if you miss the term test and have a valid reason and document(s), the final exam will be worth 80% of your final grade. This may also mean you forfeit the opportunity to receive a significant part of your term work returned before the drop date without academic penalty.

The lecture content will mainly be derived from the textbook. It stands to reason that if you want to do well you should follow lecture outlines and read the textbook! Also, recent papers published in journals and other reference sources may be used in lectures. Citations will be provided where appropriate. I will put reference material as a pdf on the web site as it is covered. It is **not** required reading although any material covered in lectures is potentially on a term test and/or exam. (The pdfs are interest and

enrichment for those that want to pursue greater depth and research. I encourage you to be as “paperless” as possible, opting for rigorous filing/naming and archival systems that allow you ready at-your-finger-tips access to journal articles you need to read or refer to.) 2

The goal of this course is to whet your appetite for animal physiology (see below). Breadth will be great; depth will at times be shallow. You should gain an appreciation of how enormous the field of animal physiology is, and that years could be spent (and are!) on researching any one aspect. HOWEVER, you should also learn how interconnected chemistry, physics, and biology really are, and how similar (and different) we are to other animals.

Primary Textbook(s):

The suggested text will be the same as that which will be used in the fall/winter session of this course (Principles of Animal Physiology by Moyes and Schulte, 2nd edition). It will be available in the UTSC bookstore (and may be available in the St. George campus bookstore).

Brief Comment/Outline:

WE humans are not the only animals on this planet, and even the class “Mammalia” is not the only class of animals, or the only vertebrate class of animals. Most importantly, there are other organisms whose physiology has been much more firmly established than our own, perhaps partly owing to the “simpler” nature of these organisms. The importance of “simpler” animals to “humanity”, science, (and humans) is exemplified by the number of Nobel Prizes for Physiology and Medicine that have been awarded to scientists studying organisms OTHER THAN humans^(#).

There are many unifying themes which exist in animal physiology, some of which will be explored. The course will begin by focusing on fundamental principles of animal physiology, beginning with atoms and molecules, chemistry, biochemistry, and cell physiology. The central and peripheral nervous systems are the most important “systems” in animals (almost all animals). Certainly this might be argued *by* the heart, or even the lungs and kidneys – but these (and most other organs) can be “replaced”.

There will be various sections of chapters assigned as self study (2 assignments), and questions provided to guide you through those readings. These questions will form the basis of each tutorial test on that particular section of the textbook. The “self-teach” material assigned from the textbook for the most part not be discussed in lecture. You may study this independently or in small discussion groups. Questions on this material will be on the final exam (which is cumulative).

This course will be as rigorous as, and similar to, the fall session of BIOB34. However, you are faced with the extra challenge of dealing with summer months. If it rains continuously for the next three months you won’t likely have a problem staying inside to study. However, this is an unlikely scenario, so be prepared to “suck it up” and work fast and hard, get your BIOB34 work done, so you can still get out and enjoy the sunshine (and still do well in the course).

Regards,

AJE

WEEK	DATE (2013)	KEY TOPICS/THEME	CHAPTER
1	May 08	BUILDING BLOCKS AND CONTROL <ul style="list-style-type: none"> - Course outline, introduction, philosophy physiology - Unifying themes: Physics and chemistry, homeostasis - Phenotype <i>vs.</i> genotype <hr/> <ul style="list-style-type: none"> - Ch2 - Energy, water, C/P/F – start reading You should start immediately reading and doing questions for tutorial quiz #1 on May 29th	1
2	May 15	CELLULAR COMMUNICATION <ul style="list-style-type: none"> - The renaissance of mitochondria, membranes and transport - Ch3 (Pg. 90-140): Cell Signaling and Endocrine regulation - Signal transduction - Intro to endocrine systems - Evolution and diversity, mechanism of action, endocrine reflexes, pituitary gland 	2, 3
3	May 22	<ul style="list-style-type: none"> - Neuron structure and function (Pg. 141-195) – methods and models....Nervous system: electrical signals, ion channels, axon, synapse - Evolutionary diversity and similarities - Synaptic transmission (chemical and electrical) 	4
4	May 29 May 29	CELLULAR MOVEMENT AND MUSCLES – LOCOMOTION (Ch. 5 – Pg.196-246) <ul style="list-style-type: none"> - Microtubules and microfilaments - Muscle structure and regulation of contraction Excitation-contraction coupling - Sliding filament theory - Smooth muscle, muscle diversity (vertebrates <i>vs.</i> invertebrates) Tutorial Quiz (Ch. 2 readings)	5
5	June 05	INTEGRATING PHYSIOLOGICAL SYSTEMS (Pg. 248-296) <ul style="list-style-type: none"> - coding of sensory signals (inputs, afferents) to the central nervous system, chemoreception (olfaction, gustation), touch/pressure, equilibrium and hearing, sight) Respiration Ch.9 Pg.410-464- Assignment #2	6
6	June 12	<ul style="list-style-type: none"> - Peripheral-Autonomic nervous system (Pg. 324-332) - Sensory and motor homunculus Catch-up/Review Session for Term Test (2nd hour)	7
7	June 19	READING WEEK	
8	June 26	TERM TEST (2h, MULTIPLE CHOICE AND <u>possibly</u> a few SHORT ANSWER Questions)	
9	July 03	Functional organization of nervous systems (Pg. 306-346) <ul style="list-style-type: none"> - Evolution of NSs, invertebrate CNS <i>vs.</i> vertebrate CNS - Peripheral NS of invertebrates <i>vs.</i> vertebrates - Circulatory systems – diversity, vertebrate plan, control of contraction, pressure. (Ch.8 - Pg. 348-362) 	7, 8
10	July 10 July 10	<ul style="list-style-type: none"> - Ion and Water Balance – The Kidney – Ch. 10 – Pg. 496-514 Hand In Assignment #2	10
11	July 17	<ul style="list-style-type: none"> - Digestion – Pg. 526-539 	11
12	July 24	<ul style="list-style-type: none"> - Muscles, Modulation of contraction (experimental) TBA - Locomotion – muscle fibre types, energy metabolism, O₂, skeletal systems Tutorial Quiz 2 (Respiratory Systems Ch.9 Pg.410-464)	12,13(in part)
13	July 31	<ul style="list-style-type: none"> - Neuro-Immuno Interactions (supplemental material) – TBA 	(12, 24)
14	Aug. 07	<ul style="list-style-type: none"> - Review / Flex Lecture - TBA 	

2000 The prize was awarded jointly to: ARVID CARLSSON, PAUL GREENGARD and ERIC KANDEL for their discoveries concerning signal transduction in the nervous system.

1995 The prize was awarded jointly to: EDWARD B. LEWIS, CHRISTIANE NÜSSLEIN-VOLHARD and ERIC F. WIESCHAUS for their discoveries concerning the genetic control of early embryonic development.

1991 The prize was awarded jointly to: ERWIN NEHER and BERT SAKMANN for their discoveries concerning the function of single ion channels in cells.

1936 The prize was awarded jointly to: SIR HENRY HALLETT DALE and OTTO LOEWI for their discoveries relating to chemical transmission of nerve impulses.

* NOTE: The schedules, procedures and policies presented here and in lecture are subject to change with minimal notice.