

BIOD43H3

Animal Locomotion and Exercise

Winter 2016

Prerequisite: BIOC33H or BIOC34H

Course Syllabus

"A lecture and seminar/discussion course covering integrative human and comparative animal exercise physiology. Topics will include muscle physiology, neurophysiology, metabolism, energetics, thermoregulation and biomechanics. These topics will be considered within evolutionary and ecological contexts.

Students will be expected to give a brief oral presentation on recently published primary research involving exercise physiology."

Instructor

Kenneth Welch, Ph.D.

Room SW521C

kwelch@utsc.utoronto.ca

Objectives

Movement and locomotion are fundamentally important to every aspect of animal biology. Animals must move to forage or capture food, to avoid becoming the next meal for something else, to find and secure a mate, and to raise young. This is a lecture and tutorial-based course intended to help students understand how animals move and how that movement differs among species and individuals based on many factors, from their locomotor style (swimming vs. walking/running vs. flying), size, age, energy state, and environmental influences. This course emphasizes understanding of the integration of biological function at multiple organizational levels (e.g. cellular, organ, organ system, whole organism). Only this integrative approach allows us to understand what enables animals to achieve locomotion, regulate exercise and effort, and respond to, and interact with, their environment. Animals from an array of taxa will be examined within ecological contexts in order to learn how these factors influence the evolution of organismal form and function.

This integrative understanding involves learning things about the physics of movement, how we push or pull against the world around us. It also involves understanding both muscle and the structural elements (bone, chitin, etc.) against which muscles work. Further, we must learn to correctly quantify the energy, work, and power of movement in order to quantitatively compare aspects of locomotion among species or among different situations. By taking this course, students will better appreciate and understand animal form and function and be capable of a greater facility with the ever expanding primary research on topics surrounding exercise physiology.

General Information

Teaching Assistant

Brandy Velten

Room SW521B

brandy.velten@mail.utoronto.ca

Prerequisite

BIOC33H or BIOC34H – Human Physiology II

Textbook

The book available in the bookstore, “Animal Locomotion” by Andrew Biewener, [Oxford animal biology series. Oxford University Press, 2003] is optional, though you may find it helpful in solidifying concepts I cover.

Many of the topics covered in this course are addressed at some level in any standard human or comparative animal physiology text. (Intended as an optional, supplemental resource) Any recent (last 2-3) edition of a human or animal physiology textbook such as Principles of Animal Physiology (Moyes and Schulte – used in BIOB34 and BIOB32), Eckert’s Animal Physiology (Randall, Burggren and French), Silverthorn, Comparative Animal Physiology (Withers), and Animal Physiology (Hill, Wyse and Anderson) will give most of the pertinent information. I will place copies of some of these various animal physiology textbooks on reserve in the library.

Lectures

Mondays 2 - 3 PM, Room **SW309** and

Wednesdays 1 – 2 PM, Room HW215

The first lecture will be on January 4th and will introduce the course material (see schedule below).

NOTE: January 4th and 6th lectures will be via WebOption only. All other lectures will be in HW215.

Tutorials

Thursdays 11 AM – 1 PM, Room AC334 or

Thursdays 3 – 5 PM, Room BV361

If you are not enrolled in both lecture and one of the two tutorial sections you will be *dropped from the course*.

Each week, the TA will host a mandatory discussion section. In the first few weeks, these discussion sections will consist of a TA-led group discussion of selected research articles from peer-reviewed scientific journals. Student participation in these discussions will be recorded. In the latter half of the course each student (5-6 students/week) will each give a short oral presentation of a journal article (relevant to the topics covered in this class) they have selected, followed by a question/answer session during each discussion section. Over 6 discussion section meetings, all students will have given one presentation. The TA will evaluate student performance during these presentations AND evaluate the participation and involvement of other students in asking questions of the presenter.

Required Readings

Electronic versions of selected readings (apart from the textbooks) required for either the lecture and/or the discussion section will be placed on the Blackboard course website prior to the date they will be discussed. In the case of primary literature, a link to the library electronic version will be provided. Students should either print out or have the electronic version of assigned journal articles with them during discussion sections.

Blackboard

The course Blackboard site will be your primary resource for lecture notes, tutorial/lecture readings, assignment instructions, course announcements, posted grades, and for asking content-based questions.

Lecture Notes

The lecture notes (the slides) will be posted on the course Blackboard site the day before (when possible), or immediately after, the lecture. Please let me know if there are any problems accessing these notes. If the lecture is not present on the site, it is not yet ready. You are *strongly* encouraged to take some notes while I talk about each slide. You are welcome to record lectures on your own devices to review at home.

Asking Questions

NOTE: Due to privacy concerns we can only respond to e-mails from official UofT e-mail addresses. E-mails from private addresses will be ignored.

Administrative/Logistical Issues

If you have logistical questions (e.g. missed lecture/exam, illness, etc.), e-mail me (kwelch@utsc.utoronto.ca).

Lecture content

If you have questions about lecture content (e.g. “How does concept XXX relate to the difference between example A and example B?”), ***post your question to the course Blackboard discussion board***. I want all students to benefit from seeing my answer to your question. Posts can be anonymous...so don't be embarrassed. ***I will not respond to e-mail directly to me asking course content questions.***

Tutorial-related questions

All tutorial-related questions (e.g. “Are we supposed to answer the questions for both assigned papers, or does question 1 refer only to paper A?”), should be directed to your TA, Brandy.

Attendance

Though I will not take attendance during lectures, I consider attendance a requirement. The TA will take attendance during tutorials. If you miss tutorial sessions, it will negatively affect your participation score.

In case of absence due to illness, only fully completed official University of Toronto Illness Verification Forms will be accepted for consideration. I cannot accept other notes.

Download the official illness verification form at www.illnessverification.utoronto.ca.

Lateness

Students that are 10 minutes or more late for lecture or tutorial are considered absent.

Regardless of absence or lateness, you are still responsible for completion of all assignments (even if you miss a tutorial for legitimate reasons).

Evaluation

Grade Breakdown

Participation, **10%**

Tutorial Assignments, **10%**

Quizzes, **10%** (total)

Midterm Exam, **20%**

Oral Presentation, **20%**

Final Exam (cumulative), **30%**

Participation (10%)

Students will be graded on their appropriate participation during TA-led AND student-led discussions of published primary research.

Tutorial Section Assignments (10%)

Students will be expected to create a select number of example exam questions and answer keys (multiple choice and short-form written answer) from material covered during the discussion sections. In addition, students will be expected to complete short peer evaluation forms for 3 of their classmates' oral presentations. The TA will assign you your peer evaluation slots.

Quizzes (10% total)

Three short multiple choice/short answer quizzes will be given at selected point throughout the course. These will cover both lecture materials and articles discussed in the TA-led discussion sections. Quiz dates will be announced at least 1 week ahead of time.

Exams (Midterm: 20%; Final: 30%)

The midterm will take place **February 22rd, 2015, during lecture time.**

The final exam will take place **TBD, in TBD.**

All exams/quizzes are closed-note. The UTSC academic ethics/cheating policies will be enforced.

The midterm and final exams will consist of multiple choice, T/F, matching questions, and short-form written answer questions. The midterm will cover It will cover material from **lectures 1-12 and tutorials 1-5**. The final exam will be cumulative. Approximately 1/3 of the material covered will be from the first half of the course (covered on the midterm) with about 2/3 of the material covered from after the midterm.

Oral Presentation (20%)

10-12 minute presentation of selected primary research article followed by 5 min question/answer session. Students are graded on presentation quality and understanding of material presented during discussion sections. You will be expected to demonstrate progress in crafting your oral presentations in the weeks preceding actual presentations (see the tutorial schedule). It is essential that you attend all lectures presentations by other students as you will participate in providing feedback and asking follow-up questions. Failure to attend other student's presentations will result in points being lost for your OWN oral presentation.

Lecture Schedule

Date	Lecture	Topic	Reading
Jan. 4	1	Introduction – What is locomotion/exercise?	Chapter 1
Jan. 6	2	How animals move and the currencies of life	
Jan. 11	3	Muscle structure I – a review of basic structure and diversity	Chapter 2, 10
Jan. 13	4	Muscle structure II - muscle diversity and support structures	Chapter 2
Jan. 18	5	Muscle mechanical function	Chapter 2
Jan. 20	6	Oral presentation tutorial	
Jan. 25	7	Movement on land I	Chapter 3
Jan. 27	8	Movement on land II	Chapter 3
Feb. 1	9	Movement on land III	
Feb. 3	10	Movement in fluid (water) I	Chapter 4
Feb. 8	11	Movement in fluid (water) II	Chapter 4
Feb. 10	12	Midterm exam review session	
Feb. 15		No lecture - Reading week	
Feb. 17		No lecture - Reading week	
Feb. 22		Midterm Exam	
Feb. 24	13	Movement in fluid (water II)/(air I)	Chapter 4, 5
Feb. 29	14	Movement in fluid (air) II	Chapter 5
Mar. 2	15	Movement in fluid (air) III	Chapter 5
Mar. 7	16	Methods for measuring energy expenditure	Chapter 8
Mar. 9	17	Cellular metabolism (a brief review)	Chapter 8
Mar. 14	18	Fueling metabolism - the integrated picture	Chapter 9
Mar. 16	19	Fueling metabolism – limitations and variations	Chapter 9
Mar. 21	20	Biotic and abiotic influences on exercise I	Chapter 8, 9
Mar. 23	21	Biotic and abiotic influences on exercise II	Chapter 8, 9
Mar. 28	22	Physical training	
Mar. 30	23	Final exam review session	

Discussion Section Schedule

Date	Disc. #	Topic
Jan. 7		No discussion section
Jan. 14		No discussion section
Jan. 21	1	Journal article discussion – led by TA
Jan. 28	2	Journal article discussion – led by TA
Feb. 4	3	Journal article discussion – led by TA (<i>hand in paper and list of references</i>)
Feb. 11	4	Oral presentation workshop (bring in your results/data slides)
Feb. 18		Reading Week – No Discussion Section
Feb. 25	5	Journal article discussion – led by TA
Mar. 3	6	Student presentations
Mar. 10	7	Student presentations, cont.
Mar. 17	8	Student presentations, cont.
Mar. 24	9	Student presentations, cont.
Mar. 31	10	Student presentations, cont.

* Disclaimer: The above schedules, procedures and policies are subject to change in the event of extenuating circumstances.