

# BIOD43H3

## Animal Locomotion and Exercise

Winter 2019

### 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.  
SW521C

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### 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

Erich Eberts

Office: SW521B

[Erich.eberts@mail.utoronto.ca](mailto:Erich.eberts@mail.utoronto.ca)

### Prerequisite

BIOC33H or BIOC34H – Human Physiology II

### Textbook

The book available in the bookstore, "[Animal Locomotion](#)" by [Andrew Biewener](#) and [Sheila Patek](#), [Oxford animal biology series. Oxford University Press] is optional, though you may find it helpful in solidifying concepts I cover. There are two versions of this book. Either will be useful, though the second version has prettier graphics and additional content. Cheap copies of version 1 are available online.

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 – recently used in BIOB34 and BIOB32), [Eckert's Animal Physiology](#) (Randall, Burggren and French), Silverthorn, 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 BV260 *and***

**Wednesdays 1 – 2 PM, Room BV264**

The first lecture will be **online only** (available January 6<sup>th</sup>) and will introduce the course material (see full schedule below).

## **Tutorials**

**Wednesdays 2 - 5 PM, Room MW223 *or***

**Thursdays 3 – 5 PM, Room IC120**

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

Each week (beginning the second week of classes), 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 and/or the associated popular press coverage (online news reports or videos). Student participation in these discussions will be monitored by the TA. Students will be expected to both answer/discuss questions and ideas addressed in the journal article as well as grade and annotate the popular news items with an eye on how well/accurately the news items present both the scientific findings and their broader importance.

## **Required Readings**

Electronic versions or links to online repositories of selected readings (apart from the textbooks, e.g. journal articles, etc.) required for either the lecture and/or the discussion

section will be placed on the Quercus 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.

## **Quercus**

The course Quercus 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 Quercus 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.

## **AccessAbility Statement**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the [AccessAbility Services Office](#) as soon as possible. Please consult the AccessAbility [Student Manual](#) regarding all policies and deadlines regarding AccessAbility requests (e.g. exam requests, etc.).

[AccessAbility Services](#) staff (located in Rm AA143) are available by appointment to assess specific needs, provide referrals, and arrange appropriate accommodations. Contact the office at 416-287-7560 or email [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca). The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

## **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.**

## **(Instructor's) Office Hours**

**Tuesdays, 10 AM - 12 PM in SW521C OR via the Bb Collaborate app**

## **Administrative/Logistical Issues**

If you have logistical questions (e.g. missed lecture/exam, etc.), e-mail me ([kwelch@utsc.utoronto.ca](mailto:kwelch@utsc.utoronto.ca)) or ask them during office hours.

## **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?”), ask them at office hours or **post your question to the course Quercus discussion board**. I want all students to benefit from seeing my answer to your question. **I will not respond directly to e-mails 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.

## **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.

## **Missed Assignments**

Please refer to the official Department of Biological Sciences “[Missed Term Work Policy](#)”.

***Note: Except under special circumstances, students are expected to complete and submit any missed assignment after the illness has passed. This means that all assignments would be due the day after the last day of self-declared absence.***

### **What do I do if I miss a term test due to an illness?**

If you miss a term test you must provide the [UTSC Verification of Illness Form](#) within 3 days of the term test to Jennifer Campbell ([jacampbell@utsc.utoronto.ca](mailto:jacampbell@utsc.utoronto.ca)) Course Coordinator in Biological Sciences. Please ensure your physician has indicated a clear start date, end date and visit date(s) on the form. Notes that are missing dates or have dates that do not correspond to the test missed will not be accepted.

### **What do I do if I am going to miss term work that is not due to an illness?**

Examples of possible documentation that can be submitted to Jennifer Campbell (note your documentation must indicate the event will occur on the date of the assignment):

- A death certificate or funeral notice
- A police accident report
- Travel ticket or flight itinerary for non-vacation or personal matters (must include departure and arrival dates and times)
- A letter from a Coach or Varsity Administration for UofT Varsity activities
- Record of a visit to an emergency room
- E-mail sent directly to the Course Coordinator from a Disability Consultant at AccessAbility Service

Samples of reasons that are NOT acceptable include personal travel (vacations), medical prescriptions, weddings, work commitments.

### **What do I do if I miss a final exam?**

Please review the [Registrar's website](#) for policies and procedures.

### **Lateness**

Students that are late 10 minutes or more 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%**

Term Assignment, **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 is scheduled to take place **February 24<sup>th</sup> (in class)**.

The date and location of the final exam is to be determined.

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 1-11 and tutorials 1-5 (subject to change)**. 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.

## **Major Term Assignment: Oral Presentation OR Scientific Podcast (20%)**

### **I. Oral Presentation**

Over several weeks in the latter half of the course each student choosing this term assignment will 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. The TA (with input from in-class 'peer reviewers') will evaluate student performance during these presentations AND evaluate the participation and involvement of other students in asking questions of the presenter.

### **II. Podcast Project**

Students choosing this term assignment will produce their own short visual podcast covering a recently published, peer-reviewed journal article (relevant to the topics covered in this class). This podcast will be for a general (educated, but non-scientist) audience. The podcast should be narrated by the student and should include selected relevant audio clips and be accompanied by static pictures/figures/tables or short



relevant video clips. These podcasts will be archived and eventually made available to the public as a general resource.

More details on these assignments will be provided in the first few weeks of the course.

## Academic Integrity

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters ([www.governingcouncil.utoronto.ca/policies/behaveac.htm](http://www.governingcouncil.utoronto.ca/policies/behaveac.htm)) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.

On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

Please avoid academic dishonesty and have confidence in your own ability to learn and grow academically by doing your own thinking and writing!

## Lecture Schedule

Date	Lecture	Topic	Reading
Jan. 6	1	Introduction – What is locomotion/exercise?	Chapter 1
Jan. 8	2	How animals move and the currencies of life	
Jan. 13	3	Muscle structure I – a review of basic structure and diversity	Chapter 2, 10
Jan. 15	4	Muscle structure II - muscle diversity and support structures	Chapter 2

Jan. 20	5	Muscle mechanical function	Chapter 2
Jan. 22	6	Movement on land I	Chapter 3
Jan. 27	7	Movement on land II	Chapter 3
Jan. 29	8	Movement on land III	Chapter 3
Feb. 3	9	Movement in fluid (water) I	Chapter 4
Feb. 5	10	Movement in fluid (water) II	Chapter 4
Feb. 10	11	Movement in fluid (water) III	Chapter 4
Feb. 12	12	Midterm review Session	
Feb. 17		No lecture - Reading week	
Feb. 19		No lecture - Reading week	
Feb. 24		<b>Midterm Exam</b>	
Feb. 26	13	Limbless (snake) locomotion	
Mar. 2	14	Movement in fluid (air) I	Chapter 5
Mar. 4	15	Movement in fluid (air) II	Chapter 5
Mar. 9	16	Movement in fluid (air) III	Chapter 5
Mar. 11	17	Evolution of flight	
Mar. 16	18	Evolution of flight/Methods for measuring energy expenditure	Chapter 8
Mar. 18	19	Cellular metabolism (a brief review)	Chapter 8
Mar. 23	20	Fueling metabolism - the integrated picture	Chapter 9
Mar. 25	21	Biotic and abiotic influences on exercise I	Chapter 8, 9
Mar. 30	22	Biotic and abiotic influences on exercise II	Chapter 8, 9
Apr. 1	23	Physical training/Final exam review session	

## Discussion Section Schedule

Date	Disc. #	Topic
Jan. 8/9		No discussion section
Jan. 15/16	1	Journal article discussion – led by TA
Jan. 22/23	2	Journal article discussion – led by TA
Jan. 29/30	3	Journal article discussion – led by TA ( <i>submit focal paper and list of references</i> )
Feb. 5/6	4	Oral presentation/podcast workshop
Feb. 12/13		Journal article discussion – led by TA
Feb. 19/20	5	Reading Week – No Discussion Section
Feb. 26/27	6	Tutorial workshop

Mar. 4/5	7	Student presentations
Mar. 11/12	8	Student presentations, cont.
Mar. 18/19	9	Student presentations, cont.
Mar. 25/26	10	Student presentations, cont.
Apr. 1/2	11	Student presentations, cont.

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

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