

## BIOD43H3 – Animal Locomotion and Exercise

Winter 2014

**Prerequisite:** BIOC33H or BIOC34H

"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.

Office: SW521C; Office Hours: Mondays/Wednesdays 3-4 PM

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Note: Due to privacy and fraud concerns **I can ONLY respond to BIOD43-related e-mails sent from an official U. Toronto e-mail address.** E-mails received after normal hours (e.g. 9-5) may not be answered until the next weekday.

**Teaching Assistant:**

Derrick Groom [[derrick.groom@mail.utoronto.ca](mailto:derrick.groom@mail.utoronto.ca)]

**Course Overview and Objectives:**

This is a lecture and tutorial-based course intended to help students improve understanding of the integration of biological function at multiple organizational levels (e.g. cellular, organ, organ system, whole organism) that enable 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. 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.

**Textbook(s):**

Optional: "Animal Locomotion" by Andrew Biewener.

Oxford animal biology series. Oxford University Press, 2003.

Available in the bookstore.

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.

**Required Reading:**

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.

**Course Homepage:** Available through Blackboard <https://portal.utoronto.ca/>. I will post a regularly-updated FAQ with an anonymous list of all general-interest questions submitted by email. Additionally, a list of primary research articles will be posted throughout the term that will serve as resources during the TA-led journal discussions as well as student presentations.

You should check the course homepage weekly for announcements, and the homepage should be your **first stop** for general information about the course material and assignments.

**Lectures:** Mondays 2 – 3 PM, Room HW214  
Wednesdays 1 – 2 PM, Room HW214

The first lecture will be on January 6<sup>th</sup> and will introduce the course material.

**Lecture Notes:** The lecture notes (the slides) will be posted on the Blackboard course webpage the evening 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. I assure you I will post lecture notes as soon as I can. While the slides you will receive are complete, you will need to take some notes while I talk about each slide.

Material covered during lectures and in laboratory exercises/manuals as well as the basic biology knowledge underlying a complete understanding of lecture/lab topics will form the subject matter for tests/quizzes.

You are welcome to record the audio portion of my lectures to review at home.

**Discussion Section:** (students attend ONE of the following)

Thursdays 11 AM – 1 PM, Room IC326, OR,  
Thursdays 1 PM – 3 PM, Room IC326

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.

**Attendance:** Students are REQUIRED to attend both the lectures and the discussion sections. If you are not enrolled in both sections you will be dropped from the course.

**Note: Only fully completed official University of Toronto Illness Verification forms will be accepted for consideration. I cannot accept other notes.**

**You can find the form at [www.illnessverification.utoronto.ca](http://www.illnessverification.utoronto.ca).**

- Evaluation:** Participation (in discussion section), **10%**  
Discussion Section 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.
- Discussion 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%):** 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.
- Midterm (20%):** Multiple choice and short-form written answer questions. Covering lectures 1 – 10 and tutorials 1-4. Wednesday, February 12<sup>th</sup>, 1:10 - 2 PM, in HW214.
- 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.
- Final Exam (30%):** Multiple choice and short essay-style answer questions. Cumulative. Date and time TBD.
- \*Note:** Review sessions will be held for both the midterm and final exam. These will be question/answer sessions. All exams/quizzes are closed-note. The UTSC academic ethics/cheating policies will be strictly enforced.

## Discussion Section Schedule

Date	Disc. #	Topic
Jan. 9		No discussion section
Jan. 16	1	Journal article discussion – led by TA
Jan. 23	2	Journal article discussion – led by TA
Jan. 30	3	Journal article discussion – led by TA ( <i>hand in paper and list of references</i> )
Feb. 6	4	Oral presentation workshop ( <i>bring in your results/data slides</i> )
Feb. 13	5	Journal article discussion – led by TA
Feb. 20		<i>Reading Week – No Discussion Section</i>
Feb. 27	6	Student presentations
Mar. 6	7	Student presentations, cont.
Mar. 13	8	Student presentations, cont.
Mar. 20	9	Student presentations, cont.
Mar. 27	10	Student presentations, cont.
Apr. 3	11	Student presentations, cont.

## 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 1 – a review of basic structure and diversity	Chapter 2, 10
Jan. 15	4	Muscle structure 2 - muscle diversity and support structures	Chapter 2
Jan. 20	5	Muscle mechanical function	Chapter 2
Jan. 22	6	Oral presentation tutorial	
Jan. 27	7	Movement on land 1	Chapter 3
Jan. 29	8	Movement on land 2	Chapter 3
Feb. 3	9	Movement in fluid (water) 1	Chapter 4
Feb. 5	10	Movement in fluid (water) 2	Chapter 4
Feb. 10	11	Midterm exam review session	
Feb. 12		<b>Midterm (subject to change)</b>	
Feb. 17		<i>No lecture - Reading week</i>	
Feb. 19		<i>No lecture - Reading week</i>	
Feb. 24	12	Movement in fluid (water 3)/(air 1)	Chapter 4, 5
Feb. 26	13	Movement in fluid (air) 2	Chapter 5
Mar. 3	14	Movement in fluid (air) 3	Chapter 5
Mar. 5	15	Movement in fluid (air) 4	Chapter 5
Mar. 10	16	Special topic: The evolution of flight	
Mar. 12	17	Methods for measuring energy expenditure	Chapter 8
Mar. 17	18	Exercise and thermoregulation	Chapter 8, 9
Mar. 19	19	Cellular metabolism (a brief review)	Chapter 8
Mar. 24	20	Circulation and respiration (in the context of exercise)	Chapter 8, 9
Mar. 26	21	Fueling metabolism - the integrated picture	Chapter 9
Mar. 31	22	Physical training	
Apr. 2	23	Final exam review session	

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