

**University of Guelph  
College of Biological Sciences  
Department of Integrative Biology**

**COURSE OUTLINE**

**Comparative Animal Physiology I (ZOO\*3600)  
Fall 2017**

**COURSE DESCRIPTION**

This course will examine the physiological processes that enable animals to live within a diverse range of environments. Lectures will focus on the underlying molecular and cellular events that mediate physiological processes and contribute to whole animal homeostasis. Particular emphasis will be placed on comparing the strategies and adaptations used by different animals when influenced by varying environmental conditions. Major themes developed in this first of two lecture courses include the fundamental mechanisms in animal physiology such as diffusion, osmosis, feedback systems, and homeostasis. The physiological systems introduced in this course include nervous, muscular, endocrine and sensory. The themes developed in this lecture course will be reinforced by hands on exercises utilizing live animals in the associated lab course ZOO\*3610.

Prerequisite(s):        BIOC\*2580, ZOO\*2090  
Recommended:        STAT\*2230 or STAT\*2040

Credit weighting: 0.5

**TEACHING TEAM**

Professor                Prof. James S. Ballantyne and Prof. Todd Gillis, PhD  
  
Teaching Assistant    TBA

**COURSE SCHEDULE**

**Lectures:** Tuesdays and Thursdays, 1:00 - 2:20  
There is no class on Oct 10<sup>th</sup>, 2017.  
Last class is Nov 30<sup>th</sup>, 2017.

**LEARNING OUTCOMES**

By the end of this course students should:

1. Understand the concept of homeostasis, the basic principles of membrane transport and how muscles, nerves, endocrine and sensory systems function in a variety of invertebrates and vertebrates.
2. Synthesize information to explain the regulation of physiological systems at multiple levels

of organization (e.g. molecular, cellular, organ systems and whole animal).

3. Integrate data from the primary literature, on a variety of animals, to build an understanding of comparative physiology.
4. Apply an understanding of physiological systems to predict the influence of environmental change on the function and regulation of mechanisms in animals.
5. Analyze a current publication in comparative physiology and identify critical connections with a classic study to describe progress in the field.

## COURSE RESOURCES

### Required Textbook (on reserve at the library)

Animal Physiology (4th Ed) by R.W. Hill, G.A. Wyse, and M. Anderson (2016). Published by Sinauer Associates, Inc., ISBN 9781605354712

\*\*\*\*\*You can also use the 3<sup>rd</sup> edition. Buy used, save your money.

### Additional Textbooks (on reserve at the library)

Eckert's Animal Physiology (5th Ed.) by Randall et al. (2002)  
Principles of Animal Physiology (1st Ed.) by Moyes and Schulte (2006)

### Courselink

This course will make use of the University of Guelph's course website on D2L (via Courselink). Consequently, you are responsible for all information posted on the Courselink page for ZOO\*3600. Please check it regularly. Lecture material will be posted the night before a lecture. This should not be treated as a substitute for the lectures; instead, this material should be used to help you prepare for lectures and should be augmented with careful lecture notes.

## COURSE CONTENT

Topic	Date	Chapter	Example questions
1) Central Themes in Animal Physiology	Sept. 7	1	Why are most physiological systems based on negative feedback mechanisms?
2) Membrane Transport of Ions & Water	Sept. 12, 14, 19	2, 5, 6, 10, 16, 28	Why do red blood cells burst in pure water? What is the difference between facilitated diffusion and active transport?
3) Nerves	Sept. 21, 26, 28, Oct 3, 5	12, 13	Why has the squid giant axon been so useful to understand neurons? What are the factors that affect conduction speed?
4) Muscles	Oct. 12, 19, 24, 26,	8, 20, 21, 25	How do muscle proteins slide back and forth to produce force and movement? How can the muscles of

			flying insects contract 10 times faster than vertebrate muscles?
5) Endocrinology	Oct 31, Nov 2, 7, 9, 14	2, 16, 17, 21	Why are thyroid hormones important for metamorphosis? What happens when estrogen mimics are present in the environment?
6) Sensory Physiology	Nov. 16,21, 23, 28, 30	14	How do sea turtles and birds use the Earth's magnetic field to migrate?

**Textbook Readings are from Hill et al. 2012 and Hill et al. 2016 (same chapters)**

## EVALUATION

Assessment				
Form of Assessment	Weight of Assessment	Date of Assessment	Course Content / Activity	Learning Outcomes Addressed
Midterm Exam	30%	Oct 17 <sup>th</sup> 2017 In class	1-3	1, 2, 3
Final Cumulative Exam	50%	TBA	1-6, with emphasis on material discussed after the midterm	1 - 4
Written Assignment (500 words)	20%	Nov 24 <sup>th</sup> 2017	1-6, assigned papers	5

## IMPORTANT DATES

Midterm: Oct 17<sup>th</sup>  
 Written Assignment: Nov 24<sup>th</sup>  
 Final Exam: TBA

## COURSE AND UNIVERSITY POLICIES

### Description of Assessment

**Exams:** Your understanding of the physiological mechanisms introduced in class and through assigned textbook readings will be assessed through an in-class midterm and a cumulative final exam held during the final exam period.

**Written assignment:** The purpose of the assignment is to demonstrate that current research is based upon the past work of others. In this assignment students will choose one set of two papers provided by the instructor to generate their report. One paper will be a classic paper, while the

other will have been published in the last two years. The report will illustrate how the work in the early study informed that in the second. More details will be provided in a handout.

### **Grading**

**Written assignment** will be submitted through the course website. Grades will be assigned according to the standards outlined in the U of G Undergraduate Calendar (p40 - 41).

**Late Policy:** The written assignment is due at 24:00 pm on Nov. XXX The late penalty is 25% of assignment value per day.

### **When You Cannot Meet a Course Requirement**

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

### **Accessibility**

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca) or see the website: <http://www.uoguelph.ca/csd/>

### **Academic Misconduct**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it.

Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

### E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

### Drop Date

The last date to drop one-semester courses, without academic penalty, for Fall 2016 is Nov. XX, 2017. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

### Copies of out-of-class assignment

Keep paper and/or other reliable back-up copies of your assignment: you may be asked to resubmit work at any time.

### Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## **CAMPUS RESOURCES**

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: <http://www.uoguelph.ca/registrar/calendars/index.cfm?index>

If you are concerned about any aspect of your academic program:

- make an appointment with a program counsellor in your degree program.  
<http://www.bsc.uoguelph.ca/index.shtml> or  
<https://www.uoguelph.ca/uaic/programcounsellors>

If you are struggling to succeed academically:

- There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time

management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.

<http://www.learningcommons.uoguelph.ca/>

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.uoguelph.ca/~ksomers/>

If you have a documented disability or think you may have a disability:

- Student Accessibility Services (SAS) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: <https://www.uoguelph.ca/csd/>