

# BIOL 339: Animal Physiology

Fall Term (2018-19)

## CALENDAR DESCRIPTION

Focus is placed on adaptive physiology and integrative function (nervous and hormonal, movement, excretion, circulation and digestion) with examples selected from various phylogenetic levels as appropriate.

PREREQUISITE: BIOL 205/3.0 or BCHM 218/3.0.

<b>Instructors</b>	<b>Chris Moyes &amp; Mel Robertson</b>
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<b>Office Hours</b>	See OnQ
<b>TA</b>	TBA
<b>TA Contact Information</b>	TBA
<b>Office Hours</b>	TBA

### Learning Objectives

The goals of Biology 339 are to provide students with a comprehensive appreciation of physiological processes under the unified themes of following:

1. Identify the components of the different physiological systems and their chemical and physical basis.
2. Discuss how systems arise from the integration of processes at different biological levels of organization, spanning molecular, cellular, organs, and whole animals.
3. Explain how homeostasis is maintained in various systems through hormonal regulation and feedback pathways.
4. Discuss the evolutionary diversity in specific physiological systems of animals.
5. Explain how animals deal with environmental stress, particularly temperature, water, osmotic and oxygen limitations.
6. Compare and contrast short-term and evolutionary solutions to physiological challenges.

## Learning Hours

<i>Teaching method</i>		<i>Average hours per week</i>	<i>Number of weeks</i>	<i>Total hours</i>
In-class hours	Lecture	3	12	36
	Seminar			
	Laboratory			
	Tutorial			
	Practicum			
	Group learning	1	4	4
	Individual instruction			
Other	Online activity	4	10	40
	Off-campus activity			
	Private study	4	12	48
Total hours on task				128

## Course Outline

**Introduction to Animal Physiology:** Unifying Principles in Physiology, Origins of Physiological Variation

### **Signalling and Communication**

- *Hormones and cell signalling:* endocrine pathways and their integration
- *Neurons:* Signals, conduction, synapses
- *Nervous systems:* organization, motor patterning, learning and memory

### **Muscles and Movement**

- *Muscles as cells and tissues:* Origins of motor proteins, sliding filament; muscle structure and regulation of contraction; muscle diversity and fiber types
- *Locomotion:* skeletal systems, translating contraction into movement, moving in the environment

### **Metabolic rate**

- *Oxygen delivery by the cardiorespiratory system:* components and diversity of respiratory systems; Function and control of cardiac system; blood and respiratory pigments; respiration diversity in water and air; gas transport in tissues
- *Determinants and regulation of metabolic rate:* metabolic arrest in its various forms

### **Homeostasis**

- *Water and Ion Balance:* nitrogen metabolism and excretion; excretory system evolution; regulation of kidney function
- *Thermal Biology:* thermal strategies, ectothermy: coping with changing body temperature, endothermy: controlling body temperature in changing environments
- *Digestion:* nature & acquisition of nutrients; nutrient metabolism; evolution of digestive systems; regulation of digestion and gut function

## Textbooks/Readings

Moyes, CD and Schulte PM. 2016. Principles of animal physiology. Third edition. Pearson. San Francisco. pp. 750. ISBN 13: 978-0-321-83817-9

### **Grading Scheme**

<b>Component</b>	<b>Weight (%)</b>	<b>Date</b>
Quizzes (4 in-class): <i>Each unit ends with an optional quiz. This is conducted in class and run as a collaborative quiz.</i>	20%	TBD
Roundtables (2): <i>Each of two exercises explores a novel topic in animal physiology, with the first week reserved for original posts and the second week for discussion.</i>	24%	TBD
Communication Exercises (2): <i>A single scientific paper is presented, first as a popular press article and second as a scientific poster.</i>	20%	TBD
Final Exam	36%	TBA

### **Grading Method**

In this course, some components will be graded using numerical percentage marks. Other components will receive letter grades, which for purposes of calculating your course average will be translated into numerical equivalents using the Faculty of Arts and Science Letter Grade Input Scheme.

When letter grades are employed, the following scale will be employed for purposes of calculating your course average:

#### ***Arts & Science Letter Grade Input Scheme***

<b>Assignment mark</b>	<b>Numerical value for calculation of final mark</b>
A+	93
A	87
A-	82
B+	78
B	75
B-	72
C+	68
C	65
C-	62
D+	58
D	55
D-	52
F48 (F+)	48
F24 (F)	24
F0 (0)	0

Your course average will then be converted to a final letter grade according to Queen's Official Grade Conversion Scale:

#### ***Queen's Official Grade Conversion Scale***

<b>Grade</b>	<b>Numerical Course Average (Range)</b>
A+	90-100

A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

### **Academic Integrity and Queen's Code of Conduct**

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and conduct conform to the principles of academic integrity. Information is available in the Arts and Science Calendar (see Academic Regulation 1 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>, on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and at Biology's website (<http://www.queensu.ca/biology/undergrad/integrity.html>) and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulations on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

### **Accommodation Policy, Exam Conflicts, and Other Conflicts**

Students who feel they need accommodations for disabilities or extenuating circumstances, or have a conflict between exams or other commitments should consult the Biology Department's website for details about how to proceed (<http://www.queensu.ca/biology/undergrad/integrity.html>). In general, the earlier a course coordinator is apprised of an extenuating circumstance, the more likely an accommodation can be made. Students are encouraged to be proactive in anticipating difficulties, when it is possible to do so.

Students may apply to write a make-up or deferred exam if they have an exam conflict as defined in the Academic Regulations of the Faculty (See Arts and Science Calendar Regulation 8 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>). In this case, the student should report to the Exams Office first to verify that there is a genuine exam conflict. Biology professors will not consider your situation to be a conflict unless it meets the criteria set out by the Faculty of Arts and Sciences.

Students may request a make-up or deferred exam if they have an exam conflict with off-campus travel associated with a field course (e.g BIOL-307/3.0 or 407/3.0) that is held during the fall or winter terms.

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**Accommodation of Disabilities**

*Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: <http://www.queensu.ca/hcds/ds/>*