

BIOL 103

Introductory Biology of Organisms

Winter Term (2013-14)

CALENDAR DESCRIPTION

An introduction to the basic themes and concepts of modern biology spanning organizational levels from organisms to ecosystems in an evolutionary context.

NOTE Lab Manual: estimated cost \$13.

PREREQUISITE BIOL 102/3.0.

SCHEDULE

Lecture Section 001 – Tuesday 12:30-1:30, Thursday 11:30-12:30, Friday 13:30-14:30, BIOSCI AUD

Lecture Section 002 – Tuesday 9:30-10:30, Thursday 8:30-9:30, Friday 10:30-11:30, BIOSCI AUD

Lecture Section 003 – Tuesday 9:30-10:30, Thursday 14:30-15:30, Friday 16:30-17:30, BIOSCI 1103

Labs: See SOLUS for a list of various lab times and locations

Instructor	Dr. V. Walker (co-ordinator) and Dr. P. Boag
Instructor Contact	Dr. Walker (walkervk@queensu.ca , Phone: 613-533-6123, Rm. 2522 – Bioscience) Dr. P. Boag (boagp@queensu.ca , Phone: 613-533-6394, Rm. 4420A – Bioscience)
Office Hours	TBA
Lab Instructor	Rob Snetsinger (snetsing@queensu.ca)
Lab Instructor Contact Info	Phone: 613-533-6000 ext 77439, Rm. 2322A - Bioscience
Office Hours	Normally, 9:30-11:30 and 1:30-3:30 Monday to Friday

Learning Objectives

Biology 103 has been designed to help students solidify their understanding of important concepts of modern cell biology and apply this understanding to the complexities of multicellular organization. In turn, knowledge of tissues, organs and whole organisms is used to develop a comparative cell biology perspective and to develop an appreciation of evolutionary divergence and convergence. Organisms will then be examined in the larger context of populations and ecosystems.

Learning Hours

The table of learning hours is only a rough estimate of the time required for the course. A 3.0 unit course would normally require a total of 110 to 130 total learning hours and this course will fall within that range, but of course, is dependent upon individual variation.

<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	2	12	24
	Tutorial			
	Practicum			
	Group learning			
	Individual instruction			
Other	Online activity	2	12	24
	Off-campus activity			
	Private study	3	13	39
Total hours on task				123

Course Outline

A. The Making of Organisms from Cells

(Duration: the first 6 weeks of lectures; 18 lectures total)

1. Nutrition and Digestion
General introduction to the course (special announcements, supporting materials etc.) as well as food procurement and adaptations in organisms (examples from plants, bacteria, protists, and agriculturally-important animals).
2. Digestion and Absorption
Digestive enzymes as well as the tissues and glands that produce these (examples mostly from insects and humans), as well as the specificity of action of selected proteases. Note to all: review protein structure and peptide bonds from Biol. 102 before class.
3. Digestion and Problems
Digestive enzymes continued as well as human diseases associated with digestion. Note to all: we may do an in-class assignment based on the last few lectures; either with clickers or on paper (bring scrap paper to class).
4. Excretion and Ion Transport I
The nitrogenous waste problem (plants, insects, developing birds, fish and humans). Please review osmosis from Biol. 102 before class in order to understand osmoregulation.
5. Excretion and Ion Transport II
The human kidney and excretory diseases. Review permeases from Biol. 102 in preparation to understand transport. Examples of pumps relevant to this section include drug pumps, bile salt export pumps and the cystic fibrosis transmembrane conductance regulator. Depending on time available, there may be an in-class review of the week's material.
6. Movement and Muscle Control
An introduction to movement (plants, protists, cultured cells) with emphasis on the vertebrate skeletal muscles (chickens, snakes, and humans). Self-directed assignment: anatomical structure of human striated muscles.

7. **Neural Transmission and Nervous Control I**
The transmission of a signal down a neuron and classes of neural transmitters using the vertebrate as a primary model. Self-directed learning assignment on sensory cells.
8. **Neuroscience**
Synaptic transmission of the signal and practical applications (e.g. insecticides, neurological diseases and their treatments, poisons produced by snakes, fish and plants). An overview of the comparative physiology of nervous systems (e.g. cnidarians, annelids, mollusks and vertebrates) and of the brain.
9. **Circulatory Systems**
General introduction to circulatory systems in organisms including plants and insects, but with an emphasis on mammalian circulatory system. Blood clotting (genetics – review of Biol. 102) and the reaction cascade will be discussed.
10. **Respiration and Gas Exchange**
Transport of oxygen to the tissues in vertebrates using red blood cells, and transport of waste carbon dioxide. Adaptations to high altitudes and embryonic development. Human diseases (genetic and parasitic) involving the circulatory system.
11. **Defence and Immunity I**
Recognition of self and defence against pathogens (innate vs. adaptive). The humoral response in mammals is emphasized (agglutination, complement, and the assembly of DNA for a light chain in the maturing B cells).
12. **Immunity and Immunogenetics**
The cellular response to pathogens (T cells and the assembly of T receptors, MHC proteins etc). Immune tolerance and human diseases of the immune system will be presented (e.g. autoimmune diseases such as diabetes).
13. **Immunity and Cancer**
Genome rearrangements (e.g. Burkett's lymphoma) in lymphocytes. Review of the causes of cancer and the Ames test from Biol. 102. Retroviruses and cancer.
14. **Evading the Immune System**
HIV (life cycle, epidemiology and social responsibility). The battle between HIV and the immune system, tested therapies, and HIV resistance mechanisms.
16. **Defence in Other Organisms and an Introduction to Hormones**
Immunity in insects and plants. Hormones important in insect and plant development.
17. **Hormones and Endocrine Systems**
Examples of development as an orchestration of steroid and peptide hormone synthesis by endocrine glands. Molecules made by mammals. Please review signal transduction mechanisms and steroid hormone action from Biol. 102. Practical applications of hormones (cheating in athletic performance and anti-doping monitoring, fish behavior, osmoregulation in humans, mineral balance in humans, as well as fish).
18. **Putting it All Together: Homeostasis and Review**

Hormone-associated diseases, and a brief overview of homeostasis and its importance, will be discussed. An in-class clicker guided review of the course will follow with examples likely be taken from recent news items associated with the subjects covered by the course.

B. Organisms to Ecosystems

(the following 6 weeks of lectures, starting after Reading Week)

1. Introduction and Darwin Biography (Video)
2. Evolution and Diversity
3. Variation and Natural Selection
4. Natural Selection in the Wild)
5. Population Genetics
6. Species and Speciation
7. Species and Systematics
8. Video: Darwin's Nightmare (Nile Perch
9. Population Ecology
10. Population Ecology
11. Video: Evolutionary Arms Race
12. Community Ecology
13. Behavioural Ecology
14. Ecosystem Structure and Function
15. Video: Guns, germs and steel
16. Conservation Biology
17. Video: Future of Life (E.O. Wilson)
18. Final Exam Preparation and Review

C. Laboratory Exercises:

Information on the laboratory exercises is available in the laboratory manual, but is likely to include muscle physiology, respiration physiology, and evolution

Textbooks/Readings

Website: <http://www.queensu.ca/biology/undergrad/courses/course/courselistings.html> Course Text (required; second-hand older editions fine or use library texts):

Biology, Canadian Edition by Brooker et. al., 2013, published by McGraw-Hill Ryerson

Website for textbook online material: <http://connect.mcgraw-hill.com/>

*Note: Access to the publisher's website is associated with the text (provided with purchase of new text)

Department of Biology website: <http://www.queensu.ca/biology/index.html>

Dates and details of readings and assignments will be announced in class and/or posted on the course website in Moodle. Dates and details for lab activities session assignments will be presented in Moodle and/or the labs

Grading Scheme

(if this is changed, ample notice will be given on the first day of class and posted on Moodle)

Component	Weight (%)	Date
Moodle tests (5)	10%	TBA
On line/Connect or other activities	6%	TBA
Lab: Assignments (announced in lab)	33%	TBA
I Clicker use: most lectures	3%	
Final Exam	48%	TBA

Grading Method

Some components (e.g. exams, online quizzes) of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen's Official Grade Conversion Scale. Other components will receive letter grades, which will be translated into numerical equivalents using the Faculty of Arts and Science approved scale. Students' course average is then converted to a final letter grade according to Queen's Official Grade Conversion Scale:

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)
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/>