

BIOL 103

Introductory Biology of Organisms

Winter 2020

CALENDAR DESCRIPTION

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

SCHEDULE

Please refer to the University Timetable for details on schedule.

CONTACT INFO

All General Enquiries and Non-Private Course Questions	Email: BIOL103@queensu.ca
Instructors	Profs Chris Moyes and Adam Chippindale
Instructor Contact	Dr. Moyes, Rm. 3121 BioSci Chris.moyes@queensu.ca ; ph: 613-533-6157 Dr. Chippindale (course coordinator), 2420 BioSci chippind@queensu.ca ; ph: 613-533-6139
Office Hours	TBA in onQ
Lab Instructor	Dr. Laura Nagel
Lab Instructor Contact Info	nagell@queensu.ca; ph: 613-533-6000 ext 77438, Rm. 2322A Bioscience
Laura's Office Hours	TBA in onQ

Learning Objectives

On successful completion of this course, you should be able to:

1. identify the roles of the major physiological systems in diverse animals and how they are regulated through electrical and chemical signals to achieve change or maintain homeostasis.
2. explain the role of nerves, muscles and cell-signalling pathways, and how they contribute to the control of physiological processes.
3. articulate the role of physiological systems and processes in disease and dysfunction
4. discuss the origins and history of life on earth and the mechanisms by which evolution generates and shapes biological diversity.
5. diagnose the conditions that alter the frequency and diversity of alleles in populations and relate this to the adaptive potential and survival of species.
6. predict the outcome of interactions between organisms at the scales of the population, the community and the ecosystem.
7. design, implement, and analyse experimental hypothesis tests related to themes of the course

8. 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	1.5	6	9
	Tutorial			
	Practicum			
	Group learning			
	Individual instruction			
Other	Online activity	3	12	36
	Off-campus activity			
	Private study	4	12	48
Total hours on task				129

Course Outline

A. Organismal Biology (Dr. Moyes)

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

Week 1: Homeostasis & Hormones.

The importance of regulation of internal conditions: feedback regulation, hormonal pathways, signaling cascades.

Week 2: Nutrition and Osmoregulation.

Regulation of nutrients and water balance: feeding modes, nutrient assimilation, ion balance, osmotic strategies.

Week 3: Internal transport.

Movement of gases, fluids, and nutrients throughout the organism: Cardiovascular physiology, respiratory systems, plant internal transport

Week 4: Immunity.

Defense against pathogens: Evolution of immune systems, innate and acquired immunity, roles of various types of blood cells in immunity

Week 5: Nerves and Muscles.

Roles of nerves and muscles in homeostasis: design of excitable tissues, nature of the membrane potential, evolution of types of myocytes and neurons, building muscle and nerve systems

Week 6: Reproduction and Development.

From gametes to organisms and back: regulation of gametogenic tissues, role of life history strategies, developmental patterns, regulation of development

B. Organisms to Ecosystems (Dr. Chippindale)

(the 6 weeks of lectures following Reading Week)

Week 7. Why evolution matters.

The importance of understanding evolution and ecology; the evidence for evolution; the pace of natural selection in the wild and in the laboratory; sources of variation; the H-W Equilibrium Principle and detecting evolution.

Week 8. Microevolution and the origin of species.

The major forces of evolutionary change: selection, drift, migration, mutation; species definitions; modes of speciation; hybrid zones; micro- versus macroevolution.

Week 9. Macroevolution and a (very short) history of life on earth.

The origins of self-replicating entities, cells, and organisms; major patterns and general processes governing changes in assemblages of organisms over earth's history; evolution of sexual reproduction and multicellularity; origins of different mating types and gametes; consequences of separate sexes; sexual selection & conflict.

Week 10. Sexual selection, conflict, and kinship.

The importance of mate choice and competition for mates in shaping sexual organisms; conflicts between the sexes, both physical and genetic; relatedness, kinship and the evolution of cooperation and altruism.

Week 11. Population & Community Ecology.

Life history strategies; population growth; the niche; species interactions (symbioses, mutualism, parasitism); the trophic structure of communities.

Week 12. Ecosystems & Conservation.

Energy and material flow in biological systems; productivity; elemental cycles; biodiversity; biological invasions; climate change; conservation.

C. Group Sessions:

Weekly group learning sessions run the continuum from laboratory to group learning. Weekly pre-lab activities are online followed by small group work completed entirely within the group session.

Textbooks/Readings

Website: <http://www.queensu.ca/biology/undergrad/courses/course/courselistings.html>

Course Text: *Campbell Biology, Canadian 2nd Edition* by Reece, Urey, Cain et. al., 2017, published by Pearson.

Different purchase options are available through the campus bookstore, and include a less expensive digital only version, a paperback & digital, and a hard copy & digital. The digital version provides the textbook itself as well as supplementary material such as practice tests, and instructional videos and tutorials.

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

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

Grading Scheme

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

Component	Weight (%)	Date
Biweekly OnQ quizzes (6)	18%	TBA
Introductory module	2%	First week
Laboratories	30%	Weekly
Dynamic Study Modules	8%	Weekly
Midterm Exam	10%	TBA
Final Exam	32%	TBA

Grading Method

Most 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/>