

## Department of Biology Course Outline

SC/BIOL 3030 4.00 Physiology of the Invertebrates  
Winter 2017/2018

### Course Description

A treatment of the physiology of major invertebrate phyla with emphasis on interphyletic relationships. Laboratory exercises address the diversity and physiology of invertebrates. Three lecture hours, three laboratory hours. One term. Four credits.

### Prerequisites

SC/BIOL 2030 4.00.

### Course Instructors and Contact Information

Course Director  
Dr. Andrew Donini  
205 Lumbers Building  
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Teaching Assistant  
Andrea Durant  
205 Lumbers Building  
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### Schedule

Lecture Times: Tuesdays and Thursdays: 8:30am to 10am in LSB 107

Lab Times:      Thursday 2:30pm to 5:30pm in Lumbers 131  
                         Friday 2:30pm to 5:30pm in Lumbers 131  
                         (Please attend only the lab section you are registered for)

## Evaluation

Results Lab Report 1 (Earthworm) Due: February 1 <sup>st</sup> /2 <sup>nd</sup>	10%
Full Lab Report 2 (Proteins/Nitrogenous wastes) Due: February 8 <sup>th</sup> /9 <sup>th</sup>	10%
Midterm Exam February 15 <sup>th</sup>	20%
Full Lab Report 3 (Malpighian tubules) Due: March 8 <sup>th</sup> /9 <sup>th</sup>	10%
Full Lab Report 4 (Daphnia) Due: March 15 <sup>th</sup> /16 <sup>th</sup>	10%
Final Exam (Formal April Exam Period)	40%

## Important Dates

See Evaluation above for due dates of labs and exams.

NOTE: for additional important dates such as holidays, refer to the "Important Dates" section of the Registrar's Website at <http://www.yorku.ca/yorkweb/cs.htm>

## Resources

There is no text book for this course. Most lecture material is sourced from primary literature (published, peer reviewed papers) and from books which are on reserve in the Steacie Science and Engineering Library.

There is no lab manual. The 4 lab protocols are posted on the Moodle course page and students are expected to download and print them prior to the lab session.

Course Website: Moodle

## Learning Outcomes

Upon successful completion of this course, students should be able to:

1. explain how specific invertebrates are important to our society from an economic standpoint and from a health perspective.

*Assessment: written tests and examinations*

2. describe the morphology and associated physiology of invertebrate adaptations to locomotion, feeding, the maintenance of solute balance, extreme temperature tolerance and the processing of sensory information through the nervous system.

*Assessment: written tests and examinations, laboratory experiments with associated written reports.*

3. describe and carry out various experimental techniques and know how to apply them to solve physiological questions.

*Assessment: laboratory experiments with associated written reports, written examinations and tests.*

4. possess good scientific writing skills and oral presentation skills.

*Assessment: written review, laboratory reports*

## Course Content

The invertebrates are a medically, economically and ecologically important group of animals. A number of invertebrates act as pathogens or vectors of disease. Malaria is one of the most important diseases in the world and is caused by a protozoan that is transmitted by anopheline mosquitoes. Economically speaking, invertebrates can be detrimental, serving as pests that destroy crops, but can also benefit us by serving as sources of food (eg. shrimp, lobster). Ecologically, invertebrates are an integral part of the food chain and can be utilized as bioindicators. Therefore it is in our best interest to study and understand the unique physiological processes of each phylum.

### Tentative Lecture Schedule:

Jan. 4<sup>th</sup>: Introduction, Importance of Invertebrates  
Jan. 9<sup>th</sup>: Physiology defined  
Jan. 11<sup>th</sup>: Classification of Invertebrates  
Jan. 16<sup>th</sup>: Unicellular Eukaryotes: Osmoregulation  
Jan. 18<sup>th</sup>: Unicellular Eukaryotes: Locomotion  
Jan. 23<sup>rd</sup>: Unicellular Eukaryotes: Feeding  
Jan. 25<sup>th</sup>: Porifera: Cell types, Architecture  
Jan. 30<sup>th</sup>: Porifera: Glass sponge, Histoincompatability, Reproduction  
Feb. 1<sup>st</sup>: Ammonia Excretion Mechanisms of Invertebrates  
Feb. 6<sup>th</sup>: Cnidaria: Cell types, nematocyst discharge  
Feb. 8<sup>th</sup>: Cnidaria: Finish nematocyst discharge, Anthozoan aggression  
Feb. 13<sup>th</sup>: REVIEW SESSION  
Feb. 15<sup>th</sup>: MIDTERM EXAM  
Feb. 19<sup>th</sup>: READING WEEK NO CLASSES, NO LABS  
Feb. 27<sup>th</sup>: Mechanoreceptors of Nematoda  
Mar. 1<sup>st</sup>: Platyhelminthes and Tubeworms  
Mar. 6<sup>th</sup>: Mollusca: Chromatophores, Iridiphores  
Mar. 8<sup>th</sup>: Mollusca: Squid Jet Propulsion  
Mar. 13<sup>th</sup>: Regeneration in Flatworms  
Mar. 15<sup>th</sup>: Echinoderms  
Mar. 20<sup>th</sup>: Arthropoda I Introduction and Endocrinology of Molting  
Mar. 22<sup>th</sup>: Arthropoda II Endocrinology of Ecdysis  
Mar. 27<sup>th</sup>: Arthropoda III Hematophagous Insects Osmoregulation  
Mar. 29<sup>th</sup>: Physiology of Cold Adaptation  
Apr. 3<sup>rd</sup>: Aquaporins and osmoregulation in aquatic insects  
Apr. 5<sup>th</sup>: REVIEW SESSION

### Laboratory Schedule:

Jan. 18, 19: Earthworm Crop and Gizzard Part 1  
Jan. 25, 26: Tutorial for Data Analysis  
Feb. 1, 2: Metabolism of Proteins  
Mar. 1, 2: Malpighian tubules  
Mar. 8, 9: Daphnia

## Experiential Education and E-Learning

Supplementary lecture material on Moodle.

## Other Information

None

## Course Policies

**Grading:** The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York (e.g., A+ = 9, A = 8, B+ = 7, C+ = 5, etc.). Lab reports and exams will bear number grade (e.g. A+ = 90 to 100, A = 80 to 90, B+ = 75 to 79, etc.)

(For a full description of York grading system see the York University Undergraduate Calendar - [http://calendars.registrar.yorku.ca/pdfs/ug2004cal/calug04\\_5\\_acadinfo.pdf](http://calendars.registrar.yorku.ca/pdfs/ug2004cal/calug04_5_acadinfo.pdf))

**Lab Reports Due Date Rules:** Proper academic performance depends on students doing their work not only well, but on time. Accordingly, the lab reports must be handed in on the due dates. **A late penalty of 10% of the final grade, per day will apply. NO EXTENSIONS WILL BE GIVEN.**

**Missed Midterm Exam:** Students with a documented reason for missing an exam, such as illness, compassionate grounds, etc., which is confirmed by supporting documentation (e.g., Attending Physicians statement) **may** be permitted to **either** take an oral make-up exam no later than **1 week** after the scheduled exam date **or** transfer the weight of the missed exam to the final exam **at the course director's discretion. Further extensions or accommodation will require students to submit a formal petition to the Faculty.** For illnesses only the current updated York University Attending Physicians Statement completely and correctly filled out will be considered as supporting documentation. **ALL** supporting documentation is to be submitted using the Online Document Submission System (a link will be provided at the top of the Moodle course page).

## University Policies

### Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

### Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Student's in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <http://www.glendon.yorku.ca/counselling/personal.html>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

### **Ethics Review Process**

York students are subject to the York University *Policy for the Ethics Review Process for Research Involving Human Participants*. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an *Application for Ethical Approval of Research Involving Human Participants* at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

### **Religious Observance Accommodation**

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at

[http://www.registrar.yorku.ca/pdf/exam\\_accommodation.pdf](http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf) (PDF)

### **Student Conduct in Academic Situations**

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/>