

Biol 227/2 Laboratory Studies in Biodiversity, Fall 2016

TUTORIAL: Location: HC-155 Day: Monday Time: 11:45 - 13:00
LABS Location: SP 380. 19 Day: T, W, J Time: 13:30-17:30

Prerequisite Biol 225; Biol 226 (previously or concurrently)

Overview This course is a hands-on survey of organism diversity, form and function.

Much of your course work in Biology will increasingly be centered on model organisms from a few phyla. Nonetheless, biologists working on a focal organism routinely compare diverse gene sequences, physiologies morphologies and behavior, assuming that each species is a natural experiment which will diversify the form or function of a focal system. Diverse, related taxa are can be thought of as experiments offering alternative solutions to common issues. Alternatively, to generalize a biological mechanism to other species, you need to have an understanding of the nature of species diversity, beginning with the phylogenetic relationships which connect them.

In lectures and the laboratory, you will encounter organism diversity in 3 modules (microbes, animals, plants), offering a survey of unfamiliar microbes and a closer look at more familiar multicellular plants and animals. Within each of these modules we will note the key features that are used to organize species into phyla as well as some problems associated with their classification and cladistics. While you will have to be able to identify diverse organisms and their lifestyles, the laboratories are also intended to introduce basic tools in organismal biology: *making and recording observations, optimizing the use of instruments, conducting experiments, analyzing data, using basic individual laboratory protocols and working within groups.* We start with basic techniques used to identify major prokaryotic clades and estimate their abundance in the laboratory. Next we survey the wildly diverse protist and fungal phyla, reviewing the key characters used to group them and looking briefly at their reproductive and life-cycle diversity. In the animal section, we review the useful, interesting, and informative characters of the major phyla through traditional slide work, behavioural studies, classification and homology exercises. Finally, we engage terrestrial plant life through studies in plant diversification, cell and tissue diversity, the nature of photosynthesis, Angiosperm classification, phylogeny and its characters of economic importance.

Overall, this course frames the structural diversity of organisms, identifies the often-surprising character homologies within the modern tree of life and throughout, introduces the utility of thinking broadly in research, biotechnology and ecology.

Key Reminders

(1) Do not copy, paraphrase or translate part or all of your lab reports *outside or inside the lab.* Just like copying an essay, report or someone else's exam, this is plagiarism - a serious academic offence.

(2) **The final lab and theory examinations will be scheduled during the formal examination period.**

TEXTS

Required *Reece et al 2014. Campbell Biology: Canadian Edition. Pearson Education N.J.*

Suggested (*useful but not required*) *Van De Graaff, K. M. and J. L. Crawley, 1996. A photographic atlas for the biology laboratory. Morton, Englewood, Colorado. The E version might be as practical as the print version, but you may not be able to retain it for other semesters.*

Necessary but free Lab Manual on the Biology 227 Moodle site.

GRADING

The term marks will be earned for the preparation, quality and content of your lab reports, and how well you do on weekly quizzes. Each lab counts for up to 2 marks (24% total). Each quiz counts for up to 1% (12% total, in the lab and lecture). The tutorial quizzes will be on the previous week's lecture. The lab quizzes will be on the content of the introduction.

The majority of marks in this course (60%) will be based on two final examinations: one a three hour theory exam and the other, a 90 minute practical (lab) exam.

The final theory exam is in a multiple choice format and counts for 24% of your total mark. The questions you will be asked are in a *format that is similar to many of the quizzes, with the content coming from the tutorial lectures and the assigned readings in Campbell Biology.*

The final lab exam (34% of your total mark) *is based entirely on the lab work, both the introduction and the weekly exercises. This practical exam will be held in the lab, during the formal examination period.*

It is not in your interest to skip either lectures or labs. Quizzes connect the tutorial lectures and labs. The tutorials should prepare you for the lab exercise and connect you to broader interests and issues of the focal organisms we are looking at in the lab. The proportion of marks allocated for term work and final exams follows:

Laboratory work

Reports to be finished in class: <i>up to 2 marks each for each report</i>	24 %
Lab spot quizzes <i>up to 1 each, best 6</i>	6 %
Tutorial spot quizzes <i>up to 1 each, best 6</i>	6 %

Lab Participation: 4%

Exams

Final, multiple choice theory exam (96 questions ~32/section) 24 %

Final practical exam 12 *microbe*, 12 *animal*, 12 *plant* questions in 2 parts 36 %

Note Laboratories will be scheduled each week in room SP 380-19 and *attendance is compulsory*, that is, there are no make - ups. *If you miss the lab you miss the marks*, unless of course you have a valid medical excuse.

Note If there is a lab quiz, it will be at the beginning of each lab. *If you are more than 15 minutes late, you will not be able to write the quiz and you will get 0 on it.*

Note Tutorial spot quizzes will be ~ 5 multiple choice questions, if you are late there will not be extra time nor are there make-ups and they will cover material from the week before.

The Biol 227/2 Moodle site *will contain* tutorial, lab and other material or interest. The PDF files require that you have the Adobe Acrobat Reader (*or some other PDF reader such as Macintosh Preview*) installed on your computer. This can be downloaded free from the Adobe website.

Contact Information

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SCHEDULE

Microbes

Week 1: Sept. 12-15 *Read Campbell Canadian , Ch 26 - be familiar with how to read and interpret phylogenies, we will build on this throughout the course.*

Lab 1. Microscope use, bacterial characters and counts

Week 2: Sept. 19-22 *Read Campbell Canadian Ch 27*

Lab 2. Bacteria & Viruses - Classify and Count

Week 3: Sept. 26- 29 *Read Campbell Ch 28*

Lab 3. Protists - unicellular and colonial eukaryotes

Week 4: Oct. 3-6 *Read Campbell Ch 31*

Lab 4. Fungi- reproductive and structural diversity

Animals

Week 5: Thanksgiving- no lecture & Oct. 11-13 *Read Campbell Ch 32 & 33*

Lab 5. Invertebrate structural diversity

Week 6: Oct. 17-20 *Review Campbell 33.3, 33.4 Annelids, Oligochaetes, Nematodes*

Lab 6. Locomotion in three worms

Week 7: Oct. 24-27 *Review Campbell Ch 33.3, 33.4*

Lab 7. Mollusk and Arthropod diversity and classification

Week 8: Oct. 31-Nov. 3 *Read Campbell Ch 34*

Lab 8. Vertebrate homology and evolution.

Plants

Week 9: Nov. 7-10 *Campbell Ch 29, 30.1, 30.2*

Lab 9. Plant Reproductive Diversity

Week 10: Nov. 14-17 *Campbell Ch 35 (selected sections)*

Lab 10. Plant Cell and Tissue Diversity

Week 11: Nov. 21-24 *Campbell Ch 10 (selected sections)*

Lab 11. Photosynthesis

Week 12: Nov. 28- Dec. 1 *Campbell Ch 30.3, 30.4, 38.1,38.2*

Lab 12. Angiosperm diversity

Review TBA