

IB 271 – Organismal Biology, Spring 2020 Syllabus

Class meeting times: MWF 11-12 (lecture), W 1-5(lab), 4014/4016 Natural History Building

Instructors:

January 21 – March 09, 2020

Professor Li-Qing Chen

379 ERML

Phone: 265-9459

Email: lqchen77@illinois.edu

March 10 – May 6, 2020

Professor Chris Cheng

17 Burrill Hall

Phone: 333-2385

Email: c-cheng@illinois.edu

TA for the plant section

Desiree Zerpa Catanho

148 ERML

Email: dpz2@illinois.edu

TA for the animal section

Bradly Raymond Scott

202B Shelford Vivarium

Email: brscott2@illinois.edu

Plant section – Dr. Li-Qing Chen (1st 8 weeks)

About me:

I am an Assistant Professor in the Department of Plant Biology and affiliated with the Carl R. Woese Institute for Genomic Biology. My lab is interested in control of sugar flux in plants. We are studying how the process of sugar allocation from the photosynthetic tissues to non-photosynthetic tissues is controlled and regulated using molecular, biochemical and genetic tools. The ultimate goal is to improve global food security by engineering sugar flux in crops.

Section description:

What and how do we know about plant biology? This course is designed to provide you with a broad overview from different perspectives including plant cell biology, plant metabolism and plant developmental biology. You will be able to apply your gained knowledge to better explain phenomena in the plant biological world and better evaluate the challenge of global issues, such as food security, we are facing.

Section Objectives:

Upon completing this course, students will be able to

1. Distinguish how plants are different from other organisms.
2. Understand the primary metabolic processes in plants
3. Explain how plants respond to environmental cues.
4. Understand how plant physiology helps to resolve some issues we are facing.

Textbook:

The basic textbook is Campbell Biology by Lisa Urry, 11th ed, but an older edition works too. Supplementary materials or readings will be provided by the instructor on Moodle.

Animal section – Prof Chris Cheng (2nd 7 weeks)

About me:

I am a Professor in the Dept. of Evolution, Ecology and Behavior (EEB), School of Integrative Biology. I study cool (literally) polar fishes, on how they evolve and adapt to freezing conditions in the Antarctic and Arctic waters. I work at multiple levels of organization, from genes and genomes, to proteins, to whole animals and field biology. This integrative approach allows me to understand the interplay of environmental driving forces and animal response and adaptation, and the underlying mechanisms at the biochemical, molecular, genomic and evolutionary levels.

Section description:

This Section aims at achieving a solid understanding in two major related areas: (i) diversity and evolutionary relationships of major animal lineages, and (ii) physiology of animals in diverse environments. The goal is to instill an understanding and strong appreciation of the animal world, and the remarkable forms and functions they evolved that are compatible with life in their particular environments.

Section Objectives:

Upon completing this section, students are expected to:

1. Become familiar with the major phyletic lineages that comprise animal diversity
2. Understand evolutionary relationships among lineages through molecular phylogenetics reconstruction
3. Understand basic organ and system physiology of animals
4. Understand adaptive physiology of animals in different environments.

Textbook and instruction materials:

The basic text book is Campbell et al. BIOLOGY, 8th ed. Journal papers and instructor prepared information comprise a substantial part of the lecture material.

Grading components for each section - (50% each section)

Lab journals/assignment/quizzes (6 @ 10 points each)	60	(6%)
Lab reports/presentation:	200	(20%)
One formal lab report	120	
One short lab report	40	
Lab poster/PPTX presentation	40	
Quizzes and/or short writes (4 @ 10 points each)	40	(4%)
Exams (2 @100 points each)	200	(20%)
TOTAL:	500 points	50%

Course grades will be assigned following the +/- scheme.

Notes regarding expectations for written work:

IB271 is set up to satisfy the campus requirement of Advanced Composition for your degree program. It aims to help you attain scientific writing skills. The advancement of science requires articulation of research studies and results in clear and understandable prose. You have started learning these skills in the first IBH core course. IB271 emphasizes further development of your skills in reading, synthesizing and writing scientific material. As you may have noted in the grading breakdown above, lab journals + lab reports and lab presentation make up over half of the total points. These exercises require significant writing effort on the part of the students, and a significant commitment on the part of the instructors to give feedback. Be cognizant that 52% of your grade relies on your written performance.

Written assignments and exercises include the following:

1. **Laboratory journals** – For any scientist, the daily record of her/his work – written in a way that it can be found and understood six months or six years from the date of the writing – is essential to progress. To be most effective, the journal entries really must be made during, or immediately after an experiment, observation or cogitation. In this course, you will be required to keep a laboratory notebook. Raw data and initial analyses will normally be recorded in a physical lab notebook. Processed data, summaries, conclusions and notes should be kept electronically. **After every experimental lab period on Wednesday**

afternoon, you will have to **submit your notebooks on Friday in class** for evaluation. The lab notebooks will be returned before the next lab period. *Note that for plant section lab 1 and lab 2, there will be no plant journals handed in, instead, you will need to complete lab 1 assignment and lab 2 quizzes from the virtual lab.*

2. Lab reports:

(i) One formal lab report from each section, *i.e.* **two for the semester.**

For Plant Section - the formal report will be prepared from the results of labs 2 and 3 (the enzyme labs).

For Animal Section - the formal lab report should be prepared from the results of the two labs (labs 4 and 5) on stress-response systems in vertebrates.

Guidance on writing – The culmination in formal scientific investigation is published research reports. To experience this, you will submit lab reports in the format of a journal manuscript. While you may discuss results among group member, **the report must be single-authored.** The paper should be precisely patterned after and formatted as a journal publication, with the following general stipulations:

- Abstract – word limit 500; a very concise synopsis of why and how you did the study, what results you obtained, and an evaluation of whether they support your hypothesis.
- Introduction – background and any hypothesis/hypotheses that were specifically tested
- Materials and Methods – organized in subsections with subtitles
- Results and Discussion – organized in subsections with subtitles
- Conclusion – word limit 500.
- Bibliography

(ii) A small lab report will be prepared from labs 4-6 of Plant section and labs 1&3 of Animal section. This short report will be **in popular science style.** Again, **the small report must be single-authored.**

- Make sure your writing is suited for a non-specialist audience;
- Make the title short and catchy;
- Begin with a general background introduction about your project;
- Describe the methods and techniques only briefly;
- Simplify results, but be accurate;
- Avoid jargon.

Writing feedback – To satisfy **Advanced Composition** requirement, each paper will be evaluated with the expectation of at least one subsequent revision. Students will submit a first draft of the reports at specified time (in the calendar at the end of this document) for comments by the TA and instructor. The final report should include improvement that incorporate instructor/TA suggestions.

3. Lab presentations:

- **Lab posters (Plant Section)** – You will pair with another student and prepare and present a poster on one lab (or set of labs). More specific instructions will be provided by the instructor/TA.
- **Lab oral presentations (Animal Section)** – You and your group members will prepare and give an oral PowerPoint presentation on a lab of your choice. More specific instructions will be provided by the instructor/TA.

4. **Quizzes/Short writes** – Quizzes will be based primarily on the readings or lectures, **including** those assigned for the day of the quiz. Short writes are homework writing exercises of one or two paragraph, or a problem set on a topic or particular interest relevant to class lectures.
5. **Exams** – Two exams are scheduled for each section. They will be **take-home exams**.

Attendance/participation:

Students are expected to attend all scheduled classes and labs and to participate in class discussion, quizzes, and perform all required lab experiments. Students are required to mute phones, laptops, and tablets. Laptops and tablets are allowed in class to use for note taking and in-class assignments or quizzes. Lecture slides will be posted on Moodle before classes. Slides are subject to change after lectures are delivered. Watch announcements on new forum of Moodle or class emails closely for updates.

Statement of Academic Integrity

The Academic Integrity Policy and Procedure from the Student Code (<http://studentcode.illinois.edu/article1/>) will apply in all instances of academic misconduct committed by students. This applies to all exams, lab reports and quizzes. Infractions of academic integrity regulations are taken seriously and can result in severe consequences, including expulsion from the University. As a student of the University it is your responsibility to become familiar with, understand, and abide by the Academic Integrity section of the Student Code. It should be noted that ignorance of these regulations is not a defense in cases of infringement of the rules of academic integrity.

Type of violation

See http://admin.illinois.edu/policy/code/article1_part4_1-402.html for complete definitions.

Violation Type	Description
<input type="radio"/> 1-402a: Cheating	Using unauthorized materials or information, e.g. in an exam.
<input type="radio"/> 1-402b: Plagiarism	Representing the words or ideas of others as your own; includes coding.
<input type="radio"/> 1-402c: Fabrication	Submitting made-up information or false documents.
<input type="radio"/> 1-402d: Facilitating infractions by others	Helping others cheat, plagiarize, etc.
<input type="radio"/> 1-402e: Bribes, favors, and threats	With the intent to affect a record of a grade or evaluation of academic performance.
<input type="radio"/> 1-402f: Academic interference	Including but not limited to computer facilities, electronic data, required/reserved readings, reference works, or other library materials.

Accommodations

Your success in studying this course is critical to us. If you are unable to complete your lab reports or exams, because of professional or personal obligations or emergency situations, you should notify the instructor IMMEDIATELY. Accommodations must be clear and brief. Decisions will be made on an individual basis. If you have a disability, please send the instructor a Letter of Academic Accommodations within the first two weeks of the semester. You can learn how to get a Letter of Academic Accommodations from DRES by following this link (<http://disability.illinois.edu/academic-support/accommodations>).

***Note: Syllabus is subject to minor adjustments during the semester to build in flexibility.**

Plant Section Schedule:

Date	Topic	Pre-Class Reading (Chapters)	Assignment schedule
01/22 (W)	Introduction: why study plants?		
	Lab 1 -Greenhouse tour and scavenger hunt	Chapter 35 web tutorial on plant anatomy –see class Moodle for link	
01/24 (F)	Plant body establishment		Assignment for lab 1
01/27 (M)	Plant growth and plant cell		
01/29 (W)	Energy flow (Enzyme)	Chapter 8	
	Lab 2 -Enzyme (virtual lab)		
01/31 (F)	Energy flow (cellular respiration)	Chapter 9	Quizzes in virtual lab 2
02/03 (M)	Lecture discussion		
02/05 (W)	Energy flow (Photosynthesis 1)	Chapter 10	Take home exam 1 posted
	Lab 3 -Enzymes		
02/07 (F)	Energy flow (Photosynthesis 2)		Lab journal for lab 3
02/10 (M)	Energy flow (Photosynthesis 3)		Take home exam 1 due
02/12 (W)	Energy flow (Photosynthesis 4 and Photorespiration)		
	Lab 4 - Chloroplast Pigments and Proteins		
02/14 (F)	Guest lecture (Prof. Lisa Ainsworth)		Lab journal for lab 4 Results/Discussion draft due
02/17 (M)	Sucrose, starch and phloem transport	Chapter 36.5-36.6	Lab report-Results/Discussion draft return
02/19 (W)	Water transport	Chapter 36.1-36.4	Lab report - Abstract/Intro draft due
	Lab 5 - Photosynthesis/Starch		
02/21 (F)	Nutrient acquisition	Chapter 37	Lab journal for lab 5 Lab report drafts return
02/24 (M)	Lecture discussion		Small lab report draft due (Lab 4-5)
02/26 (W)	Plant growth regulation	Chapter 39	Formal lab report due
	Lab 6 - Transpiration and Stomata		Small lab report draft return (Lab 4-5)
02/28 (F)	Responses to abiotic stress	Chapter 39	Lab journal for lab 6 Small lab report draft due (Lab 6)
03/02 (M)	Responses to biotic stress/Guest lecture		Small lab report draft return (Lab 6)
03/04 (W)	Biotechnology		Take home exam 2 posted
	Lab 7 - Poster Preparation		Small lab report due
03/06 (F)	Poster presentation		
03/09 (M)	Poster presentation		
03/11 (W)	Animal section		Take home exam 2 due

Cheng - Animal Section Schedule:

Date	Topics	Text Reading	Assignment schedule
03/11(W)	Evolution of life and diversity on Earth	Chapter 26	
	Lab1 - PCR amplification of CoxI from cheek DNA		
03/13 (F)	Methods of reconstructing evolutionary relationships	Chapter 25	
03/14-22	Spring Break – no class		
03/23 (M)	Phylogenies of animal kingdom	Chapter 32	
03/25(W)	Invertebrate diversity and evolution	Chapter 33	
	Lab2 - Animal anatomical survey		
03/27 (F)	Invertebrate diversity and evolution		submit lab journal
03/30 (M)	Chordate and vertebrate diversity and evolution	Chapter 34	
04/01 (W)	Chordate and vertebrate diversity and evolution		
	Lab3 - Phylogenetic reconstruction using CoxI sequences		
04/03 (F)	Principals of animal form and function	Chapter 40	
04/06 (M)	Thermal balance and adaptations	“	
04/08 (W)	Osmotic and ionic balance	Chapter 44	
	Lab4 – Osmotic balance in different salinities part 1		
04/10 (F)	Non-renal osmoregulation	“	Submit lab journal; Take-home exam1 posted; PopSci draft (labs1-3) due
04/13 (M)	Renal osmoregulation and excretion		Take home exam 1 due
04/15 (W)	Digestive systems and functions	Chapter 41	
	Lab5 - Osmotic balance in different salinities part 2		
04/17 (F)	Digestive systems and functions	“	Comments on PopSci draft returned
04/20 (M)	Respiratory systems and physiology	Chapter 42	Major lab report – draft Result/Discussion due
04/22 (W)	Blood-gas exchange	“	
	Lab6 - O ₂ binding properties of vertebrate Hb and invertebrate Hc		
04/24 (F)	Circulatory systems	“	Submit lab journal; PopSci final due
04/27 (M)	Nervous systems and neuron structures		Comments on major lab report Results/Discussion returned; Abstract/Intro draft due
04/29 (W)	Nerve signal transmission mechanisms		
	Lab7 – preparations for lab power point presentation		
05/01 (F)	Sensory systems – receptors and receptor potentials	Chapter 48	
05/04 (M)	Sensory systems – signal transduction of stimuli		Comments on major lab report Results/Discussion returned.
05/06 (W)	Motor system – EC coupling of muscle contraction		
	Lab8 – Lab power point presentations		
05/07 (Th)	READING DAY		
05/08 (F)			Take home exam2 posted
05/11 (M)			Major lab report final due
05/13 (W)			Take home exam2 due