

What is Biology 334?

As summarized by the UPS course catalog, Biology 334 is “a study of function at the systems and cellular levels in a variety of animal forms with emphasis on physiological adaptation to different habitats.”

Students in this class should aim to improve their understanding of (A) how physiological research is done, (B) how physiological information is communicated, and (C) the key discoveries made by animal physiologists over the last 100 or so years.

Laboratory experiments and “case studies” of published research papers will help students achieve Objective A. These assignments will stress the logic of the scientific method, the value of working with primary data, the need for perseverance and creativity in dealing with live organisms, and the importance of reconciling seemingly disparate findings whenever possible.

In pursuit of Objective B, students will present their work in a series of written reports and oral presentations. We will emphasize the general conventions according to which scientific information is presented, as well as the proper use of illustrative figures, scientific terminology, and references to the literature.

Objective C is what really distinguishes this course from all others offered at UPS. The course content of Biology 334 is unique in that we focus on the function of individual intact living animals (as opposed to isolated cells, multispecies communities, or organisms from other kingdoms). We will use the unifying theme of environmental challenges to structure our approach to this material – e.g., how do animals extract oxygen from the environment? How do they obtain food from the environment? How do they maintain heat, water, and salt balance in the face of environmental conditions beyond their control?

Who teaches Biology 334?

Biology 334B will be taught by me, Greg Crowther. (You may call me Greg, Professor Crowther, or Doctor Crowther. “Big C,” however, is not acceptable.) I have a B.A. in Biology from Williams College and a Ph.D. in Physiology & Biophysics from the University of Washington. As a graduate student, I conducted research on the control of glucose metabolism in exercising muscles. My physiology-related hobbies include singing science songs and running.

Biology 334A, the other section of this course, will be taught by Alexa Tullis.

As your instructor, I will strive to make this course material as accessible and interesting to you as possible. I will use a variety of teaching methods so that students who learn in

different ways may all benefit from this course. I will assign a reasonable amount of work, and I will provide timely, detailed, constructive feedback on all graded assignments. I will respect you as students and as people. Finally, I will make myself available to field your questions and comments about this course and about biology in general.

My office hours are Tuesdays from 2:00 to 4:45 PM and Thursdays from 10:00 AM to 1:00 PM. Students who make appointments using the sign-up sheet on the door of my office (Thompson 226) will be given first priority during these times. At all other times, I won't necessarily be available to provide immediate help; however, you are welcome to email me (gcrowther@ups.edu), call me (x2811), or stop by my office to solicit assistance. I will respond promptly to all reasonable requests.

Who takes Biology 334?

Students in this course should have already taken and passed Biology 111, 112, and 212.

As Biology 334B students, you should prepare for, attend, and participate fully in all lectures (Mondays, Wednesdays, and Fridays from 11:00 to 11:50 AM in Thompson 103) and all labs (Mondays from 1:00 to 4:50 PM, Tuesdays from 5:00 to 8:50 PM, or Wednesdays from 1:00 to 4:50 PM in Thompson 360). Take notes! Ask and answer questions! Turn off your cell phones and pagers! In short, take responsibility for your education! I am eager to help you as you grapple with the material, but I also expect you to take the time to help yourselves. For example, if you're confused about a particular topic discussed in lecture, your first step should be to consult the textbook and (if possible) your peers. If you are still confused after that, I will be happy to try to alleviate your confusion.

What materials are needed for Biology 334?

You will need the following texts: *Animal physiology: adaptation and environment* (1997), by Knut Schmidt-Nielsen; *Laboratory manual for Comparative Animal Physiology* (2002), by Alexa Tullis and Sue Hannaford; and *Writing papers in the biological sciences* (any edition), by Victoria McMillan. You will also need to record detailed notes about your experiments in a laboratory notebook. (Any blank standard-size notebook will work.)

On occasion, you may be asked to visit the class website, <http://www.ups.edu/faculty/gcrowther/Teaching/BIOL334B/>. This website will give you online access to materials and announcements from lectures, as well as supplementary information that may not be discussed in class.

“Will we be tested on this?”

Anything covered during lecture and/or lab may show up on an exam. There will be two “midterm” exams as well as a final exam. Each midterm will include both a closed-book in-class

component and an open-book take-home component. The final will be a closed-book affair. All exams will be cumulative, i.e., they will cover material from the first day of class up to the date of the exam. My reason for making exams cumulative is to encourage you to retain the key ideas of this course for the entire semester, if not longer.

What about late assignments and make-ups?

The maximum credit available for assignments submitted late will be reduced by 5% per day (up to a maximum penalty of 50%). This penalty will be waived only in cases of a medical or family emergency, in which case you may be asked to provide proof of the nature of the emergency.

All exams and labs are required. You will be allowed to make up an exam or a lab only if there is an unavoidable conflict with a UPS-sanctioned event, a formal interview, or a medical or family emergency. Emergencies aside, you must notify me at least seven days in advance of any exam or lab that you will not be able to attend. You may be asked to take an exam early.

In accordance with university policy, a commitment to an athletic practice will not be accepted as an excuse for missing part or all of a lecture or lab.

How will grades be determined?

Your final grade for this course will be based upon the number of points you earn out of a maximum of 760. I will convert point totals into letter grades at the end of the semester after consulting with the other Biology 334 instructor. In accordance with the fact that UPS students are expected to maintain a grade point average of 2.0 or above, a grade of C will be awarded for work that I consider just barely satisfactory. As the semester progresses, if anyone's performance falls short of this level on a regular basis, I will inform you of my concerns and ask to meet with you.

The breakdown of points is shown on the next page.

| Assignment | Due date and time | Points |
|---|----------------------------------|---------------|
| Dissection of a scientific paper | 9/16 at 11:00 AM | 0* |
| Paper #1: first submission | 9/30 at 11:00 AM | 20 |
| Midterm exam #1 (in-class component) | 10/11 at 11:50 AM | 60 |
| Midterm exam #1 (take-home component) | 10/14 at 11:00 AM | 40 |
| Mini-proposal form | Week of 10/21, at group meetings | 0** |
| Paper #1: final submission | 10/23 at 11:00 AM | 30 |
| Paper #2: editing and discussion | 11/4 at 11:00 AM | 15 |
| Independent project: annotated references #1 | Week of 11/4, in lab | 10 |
| Midterm exam #2 (in-class component) | 11/15 at 11:50 AM | 90 |
| Midterm exam #2 (take-home component) | 11/18 at 11:00 AM | 40 |
| Independent project: annotated references #2 | Week of 11/18, in lab | 10 |
| Paper #2: final submission | 11/22 at 11:00 AM | 50 |
| Independent project: draft of intro and methods | 11/27 at 11:00 AM | 15 |
| Independent project: oral presentation | Week of 12/9, in lab | 50 |
| Independent project: final research paper | 12/11 at 11:00 AM | 100 |
| Final exam | 12/20 at 10:00 AM | 200 |
| Class participation | Not applicable | 30 |

*Completion of this assignment is a prerequisite for submitting your first draft of paper #1.

**Completion of this assignment is a prerequisite for doing any experiments related to your independent project.

What exactly will we cover in this class, and when will we cover it?

A tentative schedule is provided on the next page. The topic list is rather vague in order to give us some flexibility as we progress through the semester.

| | Monday lecture | Wednesday lecture | Friday lecture | Lab (Mon., Tues., or Wed.) |
|-----------------------|-----------------------|--------------------------|-----------------------|-------------------------------------|
| 9/2 to 9/6 | Labor Day | Introduction | Metabolism overview | None |
| 9/9 to 9/13 | Temperature effects | Circulation | Circulation | Crustacean heart rate |
| 9/16 to 9/20 | Circulation | Circulation | Respiration | Oxygen consumption |
| 9/23 to 9/27 | Respiration | Case study | Water/salt balance | Oxygen consumption |
| 9/30 to 10/4 | Water/salt balance | Water/salt balance | Muscles | Oxygen binding by hemocyanin |
| 10/7 to 10/11 | Muscles | Muscles | MIDTERM | Crustacean osmoregulation |
| 10/14 to 10/18 | Case study | Digestion | Digestion | Muscle contraction |
| 10/21 to 10/25 | Fall Break | Temperature | Temperature | None; meet to discuss ind. projects |
| 10/28 to 11/1 | Temperature | Temperature | Case study | Independent projects |
| 11/4 to 11/8 | Neurons | Neurons | Neurons | Independent projects |
| 11/11 to 11/15 | Neurons | Neurons | MIDTERM | Independent projects |
| 11/18 to 11/22 | Neurons | Case study | Endocrinology | Independent projects |
| 11/25 to 11/29 | Endocrinology | Endocrinology | Thanksgiving Break | Independent projects |
| 12/2 to 12/6 | Endocrinology | Case study | Exercise | Mystery lab! |
| 12/9 to 12/13 | Exercise | Exercise | Reading Period | Oral presentations |
| 12/16 to 12/20 | Exam Week | Exam Week | FINAL (8-10 AM) | None |

Reading assignments will be announced in class.

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Questions to be addressed TODAY (Sept. 4th):

- I. What is comparative animal physiology?
- II. Why study all those weird animals bearing no resemblance to humans?
- III. What are the central themes of comparative animal physiology?