

## Biology 4120 – Comparative Physiology, Winter 2017

The objectives of the course are to expand your knowledge of the principles of physiology to describe the unity and diversity of life. To meet this objective you will read the textbook, study articles from the primary literature and discuss them in class, design experiments, work through problem sets and other activities, discuss physiology, perform and write up labs and write an independent literature research project. Your success at meeting the objectives will be evaluated by exams, homework, in-class activities, assignments, discussions and lab work. The three topics of the semester will be neurophysiology (control systems), locomotion (metabolism, flow and transport of gasses and fluids, flight) and reproductive physiology 0.

**Content Learning Objectives** Students will be able to:

1. describe how an organism's physiology contributes to its fitness in its environment and relates to its place on the **evolutionary** tree of life.
2. describe how biological **structures affect function**, from the molecular to the organ-system level.
3. describe how physiological control systems sense and process **information** to regulate physiology.
4. describe how physiological solutions optimize **energy** use, or not.
5. describe how **complex systems** are essential for physiology.

**Skill Learning Objectives** Students will be able to:

1. **clearly describe principles of physiology** with examples from many types of organisms.
2. **interpret data** from the primary physiology literature, including describing the hypothesis, approach, results and conclusions of a set of experiments.
3. **evaluate physiology experiments** from the primary literature, including identifying control experiments, and whether the results support the authors' conclusions.
4. **design a physiological experiment**, and describe the hypothesis, approach to test the hypothesis and the results that would support or refute the hypothesis
5. **contribute in a team**, and describe team experiences in a personal statement or interview.

**Writing Intensive:** This course meets the writing intensive requirement for biology majors. The writing component is an integral part of the course for all students, including non-biology majors, students who already have a degree and biology majors who have already met their writing intensive requirement. You cannot take this course without the writing intensive component. **To use this course as your writing intensive you must earn a C or better (not C- or below).**

**Prerequisites:** Completing Bio 3070 and 3200 with grades of C-minus or above are prerequisites for this course. We will especially build upon the knowledge and skills in Bio 3200. In addition, because this is the advanced writing intensive for majors, it is strongly recommend that you successfully complete your elementary and intermediate writing requirements before taking this course, and think about how you can apply what you have learned in those classes to the work you do in this course. As described in the objectives, the writing intensive focuses on learning to read and synthesize the primary and review literature in physiology. This course does not focus on basic or intermediate writing skills, but these skills are required to successfully complete this course. If you have trouble with sentence and paragraph structure or other writing skills, contact the University writing center at (313) 577-2544 or go to [www.clas.wayne.edu/writing/](http://www.clas.wayne.edu/writing/). As your TAs and I grade lab reports, term papers, exams and other assignments, we will take clear, correct writing in standard English into account.

**Instructor:** Dr. Karen Myhr

**E-mail:** [kmyhr@wayne.edu](mailto:kmyhr@wayne.edu)

**Course website:** [www.blackboard.wayne.edu](http://www.blackboard.wayne.edu)

**Office:** 2113 Biological Sciences Building

**Office Phone:** 313-577-1504

Dr. Myhr's **office hours** are from 10:45 AM until noon on Tuesdays and 9:30 to 11 AM on Fridays or by appointment to be arranged by e-mail at least 24 hours in advance.

**Lectures** meet from 2:30 to 3:45 PM on Mondays and Wednesdays in Room 426 State Hall

**Lab sections** meet in 0309 Shapero Hall (and room 318 when announced):

22074	005 Th	09:00AM - 11:50AM	Schmidtke, Michael	<a href="mailto:fq8158@wayne.edu">fq8158@wayne.edu</a>
22072	003 M	11:30AM - 02:20PM	Tarockoff, Ricci	<a href="mailto:ck2511@wayne.edu">ck2511@wayne.edu</a>
22073	004 F	11:30AM - 02:20PM	Tarockoff, Ricci	<a href="mailto:ck2511@wayne.edu">ck2511@wayne.edu</a>

### Required

Principles of Animal Physiology,  
Third Edition (Second will also work)  
by Christopher Moyes and Patricia Schulte  
ISBN: 0321501551

### Recommended

Reading The Primary Literature: A Practical  
Guide to Evaluating Research Articles in Biology  
by Christopher M. Gillen  
ISBN: 0-8053-4599-X

**Required:** An IClicker2

**Homework:** You will have an assignment due in Blackboard before each lecture, starting 1/11/17. The maximum number of homework points that will count towards your final grade is 35 points. There will be opportunities to earn at least 46 points, so if you miss one or two assignments for personal or technical reasons, you can still earn a perfect homework score. This system is **instead of** make-up opportunities for individual missed points.

**Participation:** There will be participation points available each lecture session. Most points will be earned by using your clickers or doing other work during class. The maximum number of participation points that will count towards your final grade is 40 points. There will be opportunities to earn at least 52 points, so if you miss a day or two of points for personal reasons or one-time clicker problems, you can still earn a perfect participation score. This system is **instead of** make-up opportunities for individual missed points. Let me know if you have a persistent clicker problem.

**Exams:** Three hourly exams will consist of multiple-choice, short answer and/or essay questions. In addition to material from the text book and on techniques we discuss in class, you will interpret data you have not seen before and design an experiment on each exam. Most class time will be practicing these skills, so active participation in class is the best way to do well on exams. **There are no make-up exams.** Because the exams ask you to demonstrate skills that you are still learning many students improve significantly from exam 1 to exam 2. After exam 1, students who rewrite their exam, have another student grade their exam and grade someone else's rewrite by the deadline will be earn an exam 1 bonus of half the difference between exam 1 and exam 2, if they score higher on exam 2.

**Term Paper:** You will complete one literature research paper. Small assignments that will build to the final term paper include the selection of a topic and articles, the transitions between the articles, the summary of one of your selected articles, a rough draft, and a peer review session. These assignments will help you make continuous progress through the semester. They are worth 7 to 10 points each and, except completing the peer review, are due at the beginning of your lab session. The final draft is worth 70 points.

**Resumes:** You will write a resume and cover letter (or personal statement) and participate in mock interviews for 10 points.

**Lab reports:** You will write three lab reports, one for each unit, worth 30 points each for unit 1 and unit 2, 50 points for unit 3, and 3 points for a comparative brains activity. Unit 1 & 2 lab reports will help you draw comparisons across different organisms studied that unit. Unit 3 will describe your team-designed experiment. Lab reports are due at the beginning of your lab session as indicated in the schedule.

Details of homework, participation, term paper and other lab assignments will be announced or distributed in class or lab, or posted to Blackboard. The beginning of the lab session is defined as the time that your lab session is scheduled to start. **Assignments turned in after the beginning of your lab session (even one minute), but within 24 hours of the time it was due, will be downgraded 10% of the possible points.** Assignments not turned in during lab must be taken to the Biology office. Ask the front desk personnel to time stamp your assignment and put it in your TA's mailbox. You will need to know your TA's name. You are responsible for assignments turned in to the office. If they lose your assignment, we will assume you did not turn it in. **You may not turn in or earn credit for a lab report section for a lab you did not attend and fully participate in, but there will be some make-up opportunities provided as described in the lab report assignments.**

### Exam Schedule

Exam 1, Neurophysiology	2/08/17 Wednesday during lecture, in the regular lecture room
Exam 2, Locomotion	3/27/17 Monday during lecture, in the regular lecture room
Exam 3, Reproduction	4/27/17 Thursday, 2:45 to 4:45 PM, in regular lecture room

<b>Grades:</b>	Unit Exams (225 points each)	675 points
	Homework	35
	Participation	40
	Lab reports	113
	Resume and Interviews	10
	Term paper assignments	57
	<u>Final Term Paper</u>	<u>70</u>
	Total	1000 points

**Grading Policy:** Grades will be calculated on the following scale: (out of 1000 points)

	A 92.5-100%	A- 90.0-92.4%	
B+ 87.5-89.9%	B 82.5-87.4%	B- 80.0-82.4%	
C+ 77.5-79.9%	C 72.5-77.9%	C- 70.0-72.4%	
D+ 67.5-69.9%	D 62.5-67.4%	D- 60.0-62.4%	F 0-59.9%

I do not curve the grades. Everyone can earn an A, if they perform well.

## General Policies:

**1) Anyone caught cheating or plagiarizing will automatically receive a failing grade for the exam, assignment or class, and may be expelled from the University.**

Your written work will be submitted to SafeAssign (or similar software) for an evaluation of your ideas and proper use and attribution of sources. As part of this process, you may be required to submit electronic as well as hard copies of your written work, or be given other instructions to follow. By taking this course, you agree that all assignments may undergo this review process and that the assignment may be included as a source document in SafeAssign's restricted access database, for the purpose of detecting plagiarism in such documents. Any assignment not submitted according to the procedures given by the instructor may be penalized or may not be accepted at all.

Because our goal is to help you learn how to not plagiarize, information on how to avoid plagiarism will be provided in class, on blackboard, and by your TAs. If you do not understand how to avoid plagiarism, please ask for help from your TA or from Professor Myhr in office hours. **For discussions of cheating and plagiarism see the class blackboard site, and the "Student Code of Conduct," which is available at <https://doso.wayne.edu/conduct>.**

You may only use your own clicker in class. Do not risk getting caught with a clicker that does not belong to you, or having your clicker caught with someone else. Many of the clicker questions will earn credit for any answer. For some you will be asked to work on your own and not share answers. It is cheating to share information on these individual questions. **If you are caught with someone else's clicker in class, someone else has your clicker in class or you cheat on questions that are supposed to be done on your own, you will both earn a zero for ALL of the clicker participation points for that unit.**

**2) Email guidelines:** I will not reply to emails when the answer can be found in the syllabus or on Blackboard. You must email me from your WSU account for privacy reasons and for professionalism. I will respond to most emails within two business days. After two business days, you may email me again. I expect emails to be in a professional style, with your course number and information about what the issue is in the subject, e.g. **"BIO 4120: Question on Kidney Lecture"**, a proper greeting, e.g. "Dear Professor Myhr," a proper salutation, e.g. "Sincerely, Chris Smith," correct punctuation including capitalization and no texting abbreviations. Emails that do not follow these rules may take longer get a reply, may be returned for correction, or ignored. If I cannot figure out what you want, I cannot help you. Following these guidelines will improve your success at WSU and beyond.

I do not answer questions by email if they require a discussion. This includes questions on content and study or writing strategies. Please come talk to me during office hours to discuss these issues. This may require planning ahead so that you can get your answers before assignment deadlines or exams.

**3)** If you cannot come to office hours because you have conflicts with classes, or want to meet with your teaching assistant outside of lab, you need to set up an appointment by email. In order to schedule these appointments, you need to email three unique times that you can meet to Dr. Myhr or your teaching assistant at least 24 hours in advance. We cannot guarantee that we will be available outside of scheduled class and office hours.

4) Any special considerations (disabilities, religious holiday conflicts, etc.) must be brought to the attention of the instructor by January 20, 2017 or as soon as possible as the situation arises. If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Please let me know of all disabilities that I can help you with as soon as possible. I cannot always accommodate on short notice, and I cannot accommodate issues I do not know about. Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: <http://studentdisability.wayne.edu/>

5) Problems and challenges regarding the grading of any assignment must be brought to the relevant teaching assistant's attention in a typed, concise and coherent memo within one week of the date the assignment is returned to the lab section. Once you talk to the TA about the work you are no longer eligible for a regrade.

Challenges to exam questions should be sent to Professor Myhr as an email explaining the issue. For challenges to multiple-choice questions, you need to convince me that your answer was the best answer, given reasonable assumptions that you explain. For short answers, you need to convince me there was an error in the grading, not simply that you want more points. I will regrade exams from my scanned copy of the graded exam. **Once you talk to me about the work, you are no longer eligible for a regrade. When I regrade any work I may regrade the whole assignment in addition to the section you are protesting, and your grade may drop.**

6) No assignment may be turned in to your teaching assistant by email or FAX. If you do not turn an assignment in during lab, then you may turn it in to your teaching assistant's mailbox in the Biology main office when it is open. You are responsible for requesting that the office staff time stamps your work. Know your teaching assistant's first and last name for correct delivery. The office staff does not know the teaching assignments of the graduate students. You will lose 10% of the possible points for each day an assignment is late, even if you have a valid excuse. An assignment is not considered turned in until both the digital and hard copies are submitted. A day late is from one minute after the assignment is due to 24 hours late. You will lose another 10% of the possible points for each subsequent day an assignment is late. A day is a business day on which the University is open (including days during spring break). You may turn in assignments to your teaching assistant's mailbox early without penalty, but we anticipate that this will not happen often because we expect 100% attendance in lab (and lecture).

7) **Professional behavior** is expected in lecture & lab, which includes respecting your classmates by

- arriving prepared and on time
- actively contributing to your group or the whole class
- not interrupting or talking when others are talking
- turning all electronics off or to airplane mode except as necessary for class work and
- not eating or drinking during class

All students must show respect in language and attitude towards the instructor and their fellow students. Disrespectful students will be asked to leave the lecture or lab, and will lose their opportunity to turn in any missed assignments. No unregistered students may attend lab or lecture, especially children.

8) **Withdrawals:** January 23, 2017 is the last day you can drop the class and get your tuition refunded. The last day you can drop this course and have no record on your transcript is February 5, 2017. The last day to drop this course is March 26, 2017. If you withdraw between February 6 and March 26, 2017, inclusive, you will receive a WN on your transcript if you never completed any assignment; a WP if you have greater than 60% of the points possible at the time of your request on exams, homework, quizzes and class participation; or a WF if you have less than 60% of the points possible at the time of your request. No exams or other grades are dropped in this calculation. Lab grades are not included in this calculation. In Academics: select "Course Withdrawal" from the Registration Menu under Student Resources. A **\*\*\*SMART Check\*\*\*** is required. After the registrar processes your request they send it to Dr. Myhr to assign a grade. This can take up to five business days. For the academic and registration calendar, see [reg.wayne.edu/students/calendar16-17.php](http://reg.wayne.edu/students/calendar16-17.php).

9) For any and all issues not covered in this syllabus, refer to the "Student Code of Conduct", which can be found at <http://doso.wayne.edu/assets/codeofconduct.pdf>

10) University closures will be publicized through:

- the university emergency broadcast system ([broadcast.wayne.edu](http://broadcast.wayne.edu)),
- WSU Homepage ([www.wayne.edu](http://www.wayne.edu)),
- the University Newline (313) 577-5345,
- WDET-FM (Public Radio 101.9) and
- by other local radio and television stations.

If an hourly exam is scheduled on a day when the University or lecture room is officially closed during class, the exam will be held during the next scheduled meeting of lecture that occurs when the University and room are open, or as indicated on the class blackboard site.

If the University or lab room is officially closed during your lab, any assignment that was due that day is then due at the next scheduled meeting of **lecture or your lab** that occurs when the University or lab are open, whichever comes first, or as indicated on your lab blackboard site.

11) Updates and corrections to this syllabus will be described in class and/or posted on the course Blackboard site. You are responsible for checking Blackboard announcements and your University email account. I recommend checking at least once each business day of a semester in which you are enrolled.

I will post a detailed schedule for each unit on Blackboard. I will also post a schedule of lab assignments on Blackboard.

## Lab Schedule

Start		End	Work in Lab	Assignments
1/12/17	to	1/16/17	no labs (not started and MLK day)	
1/19/17	to	1/23/17	orientation, bring term paper ideas, find articles, comparative brains	plagiarism essay due before lab, bring term paper ideas, end with draft outline, turn in brain drawings at end of lab
1/26/17	to	1/30/17	cockroach spiker boxes	turn in articles and outline (term paper assignments 1 & 2)
2/2/17	to	2/6/17	<i>c. elegans</i> chemotaxis	
2/9/17	to	2/13/17	tardigrade chemotaxis, term paper drafts	turn in one article summary (term paper assignment 3)
2/16/17	to	2/20/17	human ECG	turn in term paper rough drafts (term paper assignment 4)
2/23/17	to	2/27/17	crayfish ECG	turn in lab report 1
3/2/17	to	3/6/17	resumes and interviews, discuss on-line peer reviews of term paper drafts	on-line peer reviews due, resume/cover letter due (term paper assignment 5)
3/9/17	to	3/13/17	daphnia heart rate	
3/16/17	to	3/20/17	spring break, no labs	
3/23/17	to	3/27/17	discuss student-designed experiments	turn in term paper final drafts (term paper assignment 6)
3/30/17	to	4/3/17	design experiments and get TA approval	turn in lab report 2
4/6/17	to	4/10/17	student-designed experiments	
4/13/17	to	4/17/17	student-designed experiments	
4/20/17	to	4/24/17	presentations	turn in lab report 3
Note: Unless noted otherwise, assignments are due both online in your lab blackboard site and by hard copy before lab starts.				

## Unit 1, Neurophysiology

Design experiments to assess species differences in responses to capsaicin

Sensation and neurons (chemoreception, pp. 248-265)

Dorsal root ganglia (p. 312)

*Capsaicin article*

Nancy Wilmes on library resources

Synapses (Syn 161-165)

Invertebrate muscles (pp. 239-243)

Membrane potential (pp.69-73, 142-160)

Describe techniques with videos and student presentations

Membrane potentials – Nernst and Goldman problems

*Insect locomotion control article (moonwalker flies)*

Experimental design with UAS-Gal4 system