



Biocore 485, Organismal Biology

3 Credits H

Canvas Course URL: <https://canvas.wisc.edu/courses/104768>

Requisites

Biocore 383

Short Course Description

Physiology course that considers how plants and animals interact with their environments to survive, obtain nutrients, exchange gases, and reproduce, also how the complex systems of neural and endocrine regulation in animals and hormonal and environmental regulation in plants allow cells and organs to communicate.

Course Designations, Instructional Mode, and Attributes

Biocore 485 is the third lecture course in the four-semester Biocore sequence with intermediate level expectation which prepares students for the subsequent Biocore 587 course which is taught at the advanced level. Credit for this course counts towards Biological Science (which also meets the Natural Science) breadth requirements, and Honors credit that can be applied toward Honors in an array of majors. Biocore courses are Honors courses with no additional work required for Honors credit. The Honors designation reflects the higher-level expectations and standards consistent with Honors coursework, as well as the Biocore Honors Outcomes expected upon completion of the Biology Core Curriculum Honors Certificate.

Biocore 485 is a 3-credit Honors intermediate level lecture course that meets face-to-face and includes two 75-minute lecture class meetings each week over the fall semester led by a team of faculty instructors. It also includes a weekly face-to-face 50-minute discussion section led by a graduate Teaching Assistant (TA). Discussion sections enroll 15-16 students and are a significant component of the course that are separate from lecture yet guided by the learning objectives introduced in lecture. During discussion sections, you will work together with the guidance of a TA to clarify and extend concepts introduced in lecture through activities and problems, and have time to ask and discuss questions about lecture concepts, problem sets, exams, and other assignments/ projects. Biocore 485 carries the expectation that students will work on course learning activities (reading, written problem sets, studying, *etc*) for a minimum of 3 hours out of classroom for every course credit doing the following combination of learning activities: lecture readings, problem sets, group and individual study, and preparing for exams. See below for more information about expectations for student work.

Meeting Time and Location

Biocore 485 lecture meets at 9:30 - 10:45 am, Tues & Thurs in room 168 Noland Hall.

Biocore 485 Instructor Team

- **Dr. Elaine Alarid**, Professor of Oncology, teaches the sections on chemical signaling (endocrinology). She is a molecular endocrinologist who researches the actions of estrogens in reproduction and cancer. She also coordinates an interdisciplinary research focus group on steroid hormone function.
- **Dr. Paul Bethke**, Research Plant Physiologist with the USDA and Associate Professor of Horticulture, teaches sections on plant biology with an emphasis on how plants respond to their environment. He is a plant physiologist who studies how genotype and environment influence the molecular and biochemical processes that determine post-harvest quality of potato tubers.
- **Dr. Michelle Harris** is the Chair for Biocore 485, chair of Biocore 486 lab, and the co-chair for Biocore 384 lab. She is a functional morphologist whose education research examines how curricular tools and process of science instructional approaches affect students' learning.
- **Dr. Stephen Johnson**, Associate Professor of Comparative Biosciences, teaches the neurophysiology section. He is a neuroscientist studying respiratory motor control, neuroplasticity, and analgesia.
- **Dr. Suzanne Peyer**, Research Scientist affiliated with the McPherson Eye Research Institute and Department of

Integrative Biology, teaches cardiovascular, respiratory, and osmoregulation topics. Her main research area is in vision science involving both animal and computer vision.

- **Morgan Morales (graduate TA)**, is a graduate student in the Nelson Institute for Environmental Studies. Morgan is interested in large carnivores, and her research is focused on determining the drivers of carnivore community distribution within the Apostle Island National Lakeshore using camera traps and GIS.
- **John Riley (graduate TA)** is a graduate student in the Department of Biomedical Engineering. He is interested in prosthetics, and is studying rehabilitation and mechatronics with the goal of creating devices to fully restore function to amputees.

Instructor & TA Email & Availability

Faculty instructors and graduate TAs welcome student emails and will hold office hours by appointment.

Name	Biocore Role	Email	Office	Phone
Elaine Alarid	Instructor	alarid@oncology.wisc.edu	6151 WIMR	265-9319
Paul Bethke	Instructor	pbethke@wisc.edu	482 Horticulture	890-1165
Suzanne Peyer	Instructor	smpeyer@wisc.edu	361 Noland Hall	
Michelle Harris	Course Chair	maharris@wisc.edu	307 Noland Hall	262-7363
Stephen Johnson	Instructor	stephen.m.johnson@wisc.edu	3468 Vet Med	225-0808
Morgan Morales	Graduate TA	mjmorales@wisc.edu	524 Noland Hall	
John Riley	Graduate TA	jriley3@wisc.edu	524 Noland Hall	
Jeff Hardin	Director	jdhardin@wisc.edu	327 Zoology Research	262-9634
Janet Batzli	Associate Director	jcbatzli@wisc.edu	363 Noland Hall	263-1594
Carol Borcharding	Administrator	carol.borcharding@wisc.edu	345 Noland Hall	265-2870
Seth McGee	Lab Manager	samcgee@wisc.edu	339 Noland Hall	262-6189

Course Description

Welcome to your third semester of Biocore!

In Organismal Biology, we will build on and integrate the biological concepts you learned in Biocore 381/382 (Evolution, Ecology, and Genetics) and Biocore 383/384 (Cellular Biology), and continue to prepare you for the integrative, collaborative problem-solving nature of Biocore 587. We'll discuss how communities of cells have evolved to form whole organisms (plants and animals) and how those organisms are able to survive in a variety of environments. Our focus will be on understanding the mechanisms used in organisms to address some common issues of survival, including: how cellular and tissue functions are coordinated, how essential substances are transported to and from cells, how water, salt and pH balance are maintained, how gases (O₂ & CO₂) are exchanged and transported, how nutrients are obtained, and how organisms reproduce. Though we will not be able to cover all aspects of physiology, our objective is to help you develop a framework in which you can ask questions to learn about the physiology of organisms, both now and in the future.

Students in Biocore 485 gain exposure to and practice working with these key physiological principles:

- Regulation (homeostasis)
- Transport
- Structure-function
- Predictions via quantitative reasoning
- Interconnected systems

These principles will be illustrated using examples from neurobiology, endocrinology, gas exchange, membrane transport, osmoregulation, cardiovascular physiology, digestion, and reproduction.

Course Learning Outcomes

Primary Learning Outcomes - Biocore 485 students will be able to:

1. Frame biological questions about physiological systems, formulate testable hypotheses to guide in answering the questions, design experiments to test hypotheses (including appropriate controls), and predict/recognize/graph data that support these hypotheses.
2. Build logical arguments about the operation of physiological systems based on evidence.
3. Use and manipulate basic mathematical equations that model physiological systems.
4. Integrate past experience, accumulated knowledge, and creativity to solve complex physiological problems.
5. Recognize diversity in organismal design and response to environmental challenges.
6. Define the components of regulatory systems, propose models to explain observed physiological phenomena, and explain the fundamental role of regulation in physiological processes.
7. Explain and give specific examples to demonstrate how structure-function relationships underlie/ determine physiological phenomena.
8. Evaluate the reliability and validity of scientific information.
9. Use scientific terminology precisely and appropriately.
10. Demonstrate effective scientific discourse as a member of a group.

GRADING

Planning for strong performance

Biocore 485 final grades will be based on your performance on three 90-minute evening exams and one final exam (exam 4 + integrated questions), thirteen graded group in-class activities (ICAs), homework questions, and class attendance/participation. The lowest ICA score AND lowest homework score will be dropped. Your attendance at lecture and discussion, effort on in-class group problems, and peer evaluations of group work will determine 4% of your final grade. You will earn participation points for each day you are in lecture, based on your efforts on group problems, brief written reflections, notecard responses, etc.

Opportunities to demonstrate achievement of learning outcomes

Assessment	Date	Location	Pct grade (%)
Exam 1	Mon Sept 30 (evening)	TBA	17
Exam 2	Mon Oct 21 (evening)	TBA	17
Exam 3	Mon Nov 18 (evening)	TBA	17

Exam 4 + Integrative Qs	Tuesday Dec 17 (2:45-4:45pm)	TBA	25
In-class activities (ICA)	most Thursdays	lecture (see syllabus)	10
Homework	many Mondays (due 9:00 am)	outside class	10
Attendance & group participation	throughout course	discussion & lecture	4
		TOTAL	100

NOTE: There will be no “make ups” for missing class, missing homework, or absence for in-class activities or group problems done in lecture or discussion. If an issue is preventing you from attending class or participating fully, please reach out to one of us so we can collaborate on solutions.

Please contact **Carol Borcharding** in the Biocore Office for questions regarding course enrollment and section changes. Let Carol know by *September 10* if you have any special needs or religious holidays that conflict with a course activity. Contact your TAs regarding the correction of errors in adding points on assessments (no later than 7 days after graded exams are returned).

<p>Final grades are determined using the absolute scale at right. Intermediate grades [AB and BC] are used at the end of the semester and only for borderline cases, at the discretion of the teaching staff. Neither exam nor group problem grades will be curved.</p>	Percentage earned	Letter grade
	90.0 - 100	A
	80.0 - 89.9	B
	70.0 - 79.9	C
	60.0 - 69.9	D
	<60.0	F

Discussion Sections

Biocore 485 discussion sections meet on **Mondays** in room 371 Noland Hall. To receive credit for graded work in discussion, you must attend the section for which you are registered.

Section	Time	TA
302	9:55 am	Morgan
303	11:00 am	Morgan
304	12:05 am	John
305	1:20 pm	John
306	2:25 pm	John

Textbooks

Each instructor will give specific reading assignments from one or more of the following books:

- Animal Physiology (4th ed) by Hill et al., 2016
- Fundamentals of Plant Physiology (1st ed) by Taiz et al., 2018
- The World of the Cell (9th ed) by Hardin, Bertoni, and Kleinsmith. Benjamin Cummings, 2016

- Course specific learning materials will be posted on Canvas.

Exams

There are three 90-minute evening exams and one final exam (exam 4 + integrated questions, on Tuesday Dec.17 from 2:45-4:45pm). Physiology is cumulative by nature and each exam will assume knowledge of material covered previously. Students will not have access to electronic devices or notes during exams, and will use calculators provided by instructors. Students who are late to exams will only be given the remaining time of the original time allotment to complete the exams-- not any additional time. Exam dates and times are listed in the weekly syllabus below.

Exam regrade requests - due 7 days after graded exams are returned. Re-grade requests must be typed and worded respectfully. Provide a typed transcription of the original answer and use this as the evidence for requesting re-evaluation. Justification for re-grade consideration must be based solely on information provided in the original answer.

Weekly Syllabus

Week	Lect # & Day	Date	Instructor	Topic	Pre-class preparation
1	1 Thur	Sept 5	Team	Key physiological concepts & feedback regulation	Watch Course Introduction video <i>*extra credit opportunity</i>
2	M	Sept 9	Discussion		Homework 1
	2 Tues	Sept 10	Johnson & Bethke	ions are everywhere (also, <i>using Learning Guides effectively</i>)	Lect 2 Learning Guide
	3 Thur ☼	Sept 12	Johnson	Neurobiology 1: Membrane Potential	Lect 3 Learning Guide
3	M	Sept 16	Discussion		Homework 2
	4 Tues	Sept 17	Johnson	Neurobiology 2: Action Potentials and Conduction	Lect 4 Learning Guide
	5 Thur ☼	Sept 19	Johnson	Neurobiology 3: Synaptic Transmission	Lect 5 Learning Guide
4	M	Sept 23	Discussion: practice exam		Homework 3
	6 Tues	Sept 24	Johnson	Neurobiology 4: Neuroplasticity	Lect 6 Learning Guide
	7 Thur ☼	Sept 26	Johnson	Neuro wrap-up & review	Lect 7 Learning Guide
5	M	Sept 30	Discussion - review		Evening Exam 1: lectures 1- 6
	8 Tues	Oct 1	Alarid	Endocrine System 1: General Principles of Endocrinology	Lect 8 Learning Guide
	9 Thur ☼	Oct 3	Alarid	Endocrine System 2: Hypothalamic-Pituitary & Axis Control Systems	Lect 9 Learning Guide
6	M	Oct 7	Discussion		Homework 4
	10 Tues	Oct 8	Alarid	Endocrine System 3: Hormonal Control of Reproduction	Lect 10 Learning Guide
	11 Thur ☼	Oct 10	Alarid	Endocrine System 4: Dual Hormone Control System	Lect 11 Learning Guide Exam 1 wrapper
7	M	Oct 14	Discussion		Homework 5
	12 Tues	Oct 15	Alarid	Endocrine System 5: Making Logical Conclusions based on Evidence	Lect 12 - 13 Learning Guide
	13 Thur ☼	Oct 17	Alarid	Endocrine wrap-up & review	Lect 12 - 13 Learning Guide

8	M	Oct 21	Discussion - review		Evening Exam 2: lectures 7- 13
	14 Tues	Oct 22	Peyer	Cardiovascular 1	Lect 14 - 15 Learning Guide
	15 Thur ☼	Oct 24	Peyer	Cardiovascular 2	Lect 14 - 15 Learning Guide
9	M	Oct 28	Discussion		Homework 6
	16 Tues	Oct 29	Peyer	Respiratory 1	Lect 16 - 17 Learning Guide
	17 Thur ☼	Oct 31	Peyer	Respiratory 2	Lect 16 - 17 Learning Guide
10	M	Nov 4	Discussion		Homework 7
	18 Tues	Nov 5	Peyer	Renal / Osmoregulation 1	Lect 18 - 19 Learning Guide
	19 Thur ☼	Nov 7	Peyer	Renal / Osmoregulation 2	Lect 18 - 19 Learning Guide
11	M	Nov 11	Discussion		Homework 8
	20 Tues	Nov 12	Team	Integrative Case Exercise	TBA
	21 Thur ☼	Nov 14	Team	Integrative Exercise: teams report out	TBA
12	M	Nov 18	Discussion - review		Evening Exam 3: lectures 14- 21 (includes Q's from integrative case)
	22 Tues	Nov 19	Bethke	Intro to Plants	
	23 Thur ☼	Nov 21	Bethke	Water relations 1: water potential & flow in xylem	
13	M	Nov 25	Discussion		Homework 9
	24 Tues ☼	Nov 26	Bethke	Water relations 2: guard cells & flow in phloem	
	Thanksgiving Break Nov. 28-Dec. 1				
14	M	Dec 2	Discussion		Homework 10
	25 Tues	Dec 3	Bethke	Nutrient uptake & transport	
	26 Thur ☼	Dec 5	Bethke	Light signaling	
15	M	Dec 9	Discussion - review		Homework 11
	27 Tues	Dec 10	Bethke	Interactions between phytohormones	

Exam 4 + Integrative Questions, Tuesday Dec. 17, 2:45-4:45pm

Homework & Other Assignments

Homework assignments are due Mondays at 9:00 am by submission to the Canvas course site.
13 graded group in-class activities (ICAs) are submitted on "formal" Thursdays

In-Class Activities (ICA) and Group Work Expectations

You will be assigned to a permanent group of 3-4 students. We expect you to sit with your assigned group for each class meeting (usually Thursdays) that has a scheduled in-class assignment (ICA). On days when graded ICAs are NOT

scheduled (casual Tuesdays), you may work with anyone on in-class group problems. Each member of your group is expected to prepare for and make equivalent contributions to in-class problems.

Graded ICAs - The 13 graded group in-class activities (ICAs) will occur on selected days (“formal” Thursdays + Tuesday before Thanksgiving). Graded ICAs must be completed collaboratively during class, within assigned groups. ICAs are graded on a 3-point scale, but groups that provide outstanding, precisely worded answers on their ICAs will earn 4 out of 3 possible points.

Learning Community Expectations

To ensure that no one is distracted during class meeting times, we expect that any use of electronic devices (cell phones, tablets, computers, etc.) be limited exclusively for Biocore 485 class-related activities.

Learning goals for Biocore 485 groups- Students working in teams will:

1. demonstrate effective scientific discourse as a member of a group
2. demonstrate balanced contributions to their group’s work
3. use relevant vocabulary and appropriate graphing skills in their group problem answers
4. encourage creativity from their teammates
5. integrate and synthesize information from lecture and assigned readings when formulating group answers

Biocore 485 group roles

Each member of the group will take one of the following roles each week. These roles will rotate among teammates.

- *Recorder/Reporter* – takes notes, writes final group response, reports out to whole class
- *Brainstormer* – explores options, encourages creativity in teammates, draws on information from previous lectures and readings
- *Quality Controller* – identifies weaknesses in arguments, presents alternative lines of thinking, ensures use of appropriate vocabulary and graphing conventions (i.e., axis labeling) in group answers.

Student Board of Directors (BOD)

The BOD consists of one representative from each discussion section and meets with the teaching staff each week (Fridays @ 8:30 in room 327 Noland Hall) to discuss concerns or offer suggestions about the course. BOD representatives are responsible for communicating with their peers and write a short statement summarizing the weekly meeting in the course announcements.

Rules, Rights & Responsibilities

See the UW-Madison Guide’s [Rules, Rights and Responsibilities](#)

Accommodations

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform Michelle Harris of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Michelle Harris will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student’s educational record, is confidential and protected under FERPA. <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

Questions regarding classroom accommodations can be directed to the McBurney Disability Resource Center (mcburney@studentlife.wisc.edu, 608/263-2741).

DIVERSITY & INCLUSION

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.

<https://diversity.wisc.edu/>

Biocore's Statement on Creating an Inclusive Classroom

In Biocore, we strive for the utmost equity for all students, TAs, and faculty/ staff, regardless of race, ethnicity, gender, sexual orientation, (dis)ability, socioeconomic status, country of origin, or religious affiliation. Our community and our science depend on engaging and embracing different perspectives and this starts with each of us understanding and recognizing our own biases. It takes a great deal of awareness and self-work to recognize bias. Most of us stumble at times, so we all need to practice.

If you experience or notice bias

Share when you first experience or notice bias. If you are further offended and continue to experience bias, do not hesitate to bring this to your instructor's attention and/or report the case through UW Madison's [Bias Incident Reporting system](#)

If you mistakenly say or do something you wish you hadn't—apologize, say 'I'm sorry' and take ownership when you have offended someone, even if it was unintentional.

Discrimination and bias are not OK. Saying nothing perpetuates inequality. Speaking up reminds us of our inclusive classroom goal. It takes everyone to create a safe, supportive and productive learning environment. If even one of us feels stifled or unaccepted, we all lose out.

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/

BIOCORE STATEMENT OF ACADEMIC INTEGRITY

We trust you to do your own, best work on all homework, group problems, and exams. Remember, you formally agreed to this when you signed the Biocore Honor Code last fall (the Honor Code is printed on the last page of this handout). If you have exceptional circumstances that prohibit you from doing your own, best work, please see us to talk about it.

What is academic integrity and why are we promoting it? Academic integrity **means being honest about your intellectual work** which is fundamental to the pursuit of knowledge. We ask you to sign this honor code as a pact between you and the Biocore Program faculty/staff to abide by the academic rules of conduct laid out by the University. Without these rules of conduct our institution would be severely limited in its capacity to function as community of higher learning.

As a UW-Madison student, it is your responsibility to be informed about what constitutes academic misconduct, how to avoid it and what happens if you decide to engage in it. For more information, see <https://conduct.students.wisc.edu/academic-integrity/>

These guidelines protect both you and the university if an infraction has occurred. Ignorance of these regulations is not a defense in cases of infringement. So.. Just DON'T Do It!

DEFINITION OF ACADEMIC DISHONESTY

Academic misconduct is governed by state law, **UWS Chapter 14** ([PDF](#))

Misconduct includes the following, but is not limited to this list:

- Seeks to claim credit for the work or efforts of another without authorization or citation (plagiarism)
- Uses unauthorized materials or fabricated data in any academic exercise (using notes for a closed-book online exam)
- Forges or falsifies academic documents or records (having a friend sign you in for attendance when you're absent)
- Intentionally impedes or damages the academic work of others (tampering with another student's experiment)
- Engages in conduct aimed at making false representation of a student's academic performance (altering test answers and submitting the test for regrading)
- Assists other students in any of these acts

Examples include but are not limited to: cutting and pasting text from the web without quotation marks or proper citation; paraphrasing from the web without crediting the source; using notes or a programmable calculator in an exam when such use is not allowed; using another person's ideas, words, or research and presenting it as one's own by not properly crediting the originator; stealing examinations or course materials; changing or creating data in a lab experiment; altering a transcript; signing another person's name to an attendance sheet; hiding a book knowing that another student needs it to prepare an assignment; collaboration that is contrary to the stated rules of the course, or tampering with a lab experiment or computer program of another student."

CONSEQUENCES FOR ACADEMIC DISHONESTY

To determine whether academic dishonesty has occurred, the instructor and Biocore administrators will meet with the student. In Biocore, students who commit acts of academic misconduct will write letter describing what they did and, if appropriate, apologize to individuals who were involved in the incident. In alignment with the penalties listed in the University's UWS14, Student Academic Disciplinary Procedures we recognize three levels of consequences (1) An oral reprimand; and (depending on the severity of the case) written reprimand presented only to the student; or an appropriate assignment to be evaluated by the instructor or Biocore administrative staff, (2) a lower or failing grade on the assignment, exam, or course; removal of the student from the course or program; and a written reprimand included in the student's university disciplinary file, (3) recommendation for disciplinary probation for up to 2 years, suspension, or expulsion from the University.

BIOCORE HONOR CODE

You will be asked to sign a statement upon entering the Biocore program during the first week of class in Biocore 381. In order to participate in the Biocore Program you must agree to the following principles:

1. I will report laboratory data honestly and accurately. Under no circumstances will I fabricate data or change data to fit what I think it should be.
2. All work that I submit under my name will be my own. I will not copy or paraphrase from another student presently or previously enrolled in this course.
3. For projects where collaboration is explicitly permitted, I will list the names of students with whom I worked.
4. I will not allow another student to copy or "borrow" my laboratory reports or other assignments.
5. I will not forge or falsify academic documents including graded assignments and examinations
6. I will strive to make Biocore a community that is based on honesty and integrity.