## COURSE SYLLABUS

**Carnegie Mellon University**  
**Department of Psychology**

### 85-219 Biological Foundations of Behavior  
**Spring 2017**  
**Professor Marlene Behrmann**

<table>
<thead>
<tr>
<th><strong>Course Meetings</strong></th>
<th>Mondays, Wednesdays BH 136A 10.30-11.50am</th>
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</table>
| **Instructor**      | **Professor Marlene Behrmann**  
Email: behrmann@cmu.edu  
Office: 331 Baker Hall |
|                     | *Email is the best means of contacting Prof Behrmann. You can expect a response within 48 hours except on weekends.* |
| **Graduate Teaching Assistant**  
Four undergrad TA/graders | **Elliot Collins**  
Email: egcollin@andrew.cmu.edu  
Office hours: 3-4 pm Monday (Psych lounge) |
| **Course Web Site** | [http://www.cmu.edu/blackboard](http://www.cmu.edu/blackboard)  
(Listed as course 85-219) |
|                     | *If you are not able to access the site, please contact TA by email* |
| **Required Textbook** | **An Introduction to Brain & Behavior**  
B. Kolb & I.Q. Whishaw  
Worth Publishers, 2014  
4th Edition |

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85-219 Biological Foundations of Behavior
Have you ever wondered ...

- how we learn and remember?
- how we see and hear?
- how various kinds of brain damage affect behavior?
- what it is like to explore a real brain?

This course will provide you with a general introduction to the underlying biological principles and mechanisms that give rise to complex human behavior. Topics to be covered may include: the anatomical structure of nerve cells and how they communicate, properties of brain organization and function, processing in sensory systems, cognitive neuroscience, and neural and hormonal influences on health and emotion. This course will focus on how emerging methods and approaches are beginning to make it possible for psychologists, computer scientists, statisticians, engineers and biologists to gain an integrated understanding of complex behavior.

Upon successfully completing this course, I expect that you should be able to:

- discuss foundational issues of brain and behavior such as basic principles of neural communication, the functioning of our sensory/perceptual systems, and the neural substrates of learning, memory, and language
- apply this core knowledge to understanding the brain research you encounter in daily life, such as through the popular press or in other coursework
- appreciate the disabilities that arise through brain damage
- understand the benefits and limitations of various methods for studying brain and behavior
- develop a respect for the complexity of the biological foundations of human behavior and for the ingenuity of the methods used to study them
- critically evaluate theories and models in science
- synthesize sources of information gained from multiple methods to understand the brain/behavior relationship
- communicate your knowledge through writing, class participation, and examination

**REQUIREMENTS & EVALUATION**

Exam #1  
Exam #2  
Exam #3  
Exam #4  

75% of total grade  
(calculated from top 3, drop lowest score)

Quiz #1  
Quiz #2  
Quiz #3  
Quiz #4  

20% of total grade  
(calculated from top 3, drop lowest score)

Lab #1  
Lab #2  

5% for participation
The course will follow a lecture format. Lectures will be held on Mondays and Wednesdays at 10.30-11.50am, and will incorporate discussions and demonstrations. **Attendance is expected.**

There will be a total of **4 in-class quizzes.** The quizzes will help you to stay on top of the information in preparation for the examinations. Your quiz grades will cumulatively comprise 20% of your final grade. Absolutely no make-up quizzes will be administered. It is your responsibility to be present and prepared for the quizzes. Be on time for the quizzes. They are administered at the beginning of class, 10.30am sharp. It is your responsibility to be on time. Quizzes last about 15 minutes. **Your lowest quiz score will be dropped from the calculation of your final grade.**

The **4 exams** will carry equal weight and the total will constitute 75% of your grade. Material covered in one exam will not be re-examined in subsequent exams, except at the level of general knowledge. Exams will be held during class. Exams will cover material presented in lecture and in assigned readings, with an emphasis on lecture material. Each examination will be closed-book and closed-notes. The format of the exams will be a mixture of multiple choice, short answer and short-essay questions. The goal of the exams is to test understanding rather than merely memorization and recall. Nonetheless, there is a great deal of new vocabulary and many new concepts to learn. Expect to be challenged. There will be **absolutely no make-up exams, Your lowest exam score will be dropped from the calculation of your final grade.**

There will also be two in-class **laboratory sections.** The material from these labs will be covered on the examinations. The laboratory will give you the chance to experience neuroscience hands-on by dissecting a real brain and eye. Your participation is worth 5% of your final course grade. There will be **absolutely no make-up labs.** You must remember to sign-in to the laboratory to receive credit.

**Letter grades** for individual exams/quizzes will be computed in the following manner:

1. The two highest scores from the class will be averaged. This average is considered to be the maximum attainable for this exam (in this sense, the exam is “curved”). [e.g., Bob has 90 points and Amy has 92 points – the maximum attainable is taken to be 91 points].
2. All scores are represented as a percent of this maximum. [e.g., Sue’s score is 76 points, or 83.5% of 91]. Note that this provides a means of earning extra credit. (e.g., Amy would earn 101% on this exam). **This is the only form of extra credit in the class.**
3. Letter grade estimates are assigned according to a fixed scale as follows (e.g., Sue would earn a B)
   
   100–90 = A  
   80–89 = B  
   70–79 = C  
   60–69 = D **DANGER!** – Be concerned. Talk to your instructors. Find out what is going wrong early in the semester to bring your grade to an acceptable level.

You can use these letter grades to keep track of your approximate standing in the class. At the end of the semester, your final grade will be computed by taking the percent of maximum attainable points you have earned and scaling by the weight of the requirement in the course.

For example, if the percentages that Sue has earned on the exams are 83.5%, 77%, 62% and 91% (after scaling as described above). We would drop the lowest score, 62%. Then Sue’s cumulative exam score is the average of the remaining 3 scores, or 83.8%. The entire course will be assumed to be worth 1000 points. Exams are weighted 75%, i.e., 750 points. Sue earned 83.8% of the exam points, or 628.5 total exam points. Scaling like this is performed for every score category and letter grades are assigned in the same manner that they are for individual exams/quizzes based on your overall percent points earned.
Grades will be posted on the course website in a manner that respects student privacy via Blackboard as soon as they are available. Please do not email to ask about your grade; check Blackboard instead as scores will be posted as soon as they are available.

In addition to these course evaluations, the Department of Psychology has a Research Requirement that is mandatory for ALL students enrolled in entry-level courses in psychology. The Research Requirement allows you to choose one of two options: 1) participate in 3 credits worth of experiments or 2) read a research article and answer a set of questions. Each of these options amounts to less than 3 hours. If you do not fulfill the Research Requirement, you will receive an incomplete in this course. The Research Requirement will be explained to you more fully in class.

There is a web site to accompany this course. You can find it at the following URL: http://www.cmu.edu/blackboard/. You can find the syllabus, course announcements, and course objectives on the web. There is also information on how to contact your instructors and a link to sign up online for experiments to fulfill the research requirement. We will also post some class announcements on the website. USE THIS WEBSITE AS YOUR FIRST LINE OF INFORMATION.

A note on class notes: This course will be taught in lecture format. Despite this format, I hope you will become involved in class – ask questions, suggest alternative hypotheses, etc. It’s much more interesting for everyone this way. To facilitate this, class notes will be made available on the course web page. This is done to encourage in-class discussion – the hope is that you will not frantically try to copy details from the slides, but rather that you will get involved in class. Note that viewing class notes online is not an adequate substitute for attending class. The class notes will not provide all of the information delivered in class; they are merely outlines. Furthermore, you are responsible for all material presented in class – including demonstrations, labs, and multimedia that cannot be reproduced online. The format of the class notes will be PDF files. To view them, you will need a copy of Adobe Acrobat Reader. In past courses, we have examined many forms of online document presentation. None is perfect, but PDF files are a reasonable compromise. Course notes will be presented only in this electronic format.

For assistance with the written or oral communication assignments in this class, visit the Global Communication Center (GCC). GCC tutors can provide instruction on a range of communication topics and can help you improve your papers and presentations. The GCC is a free service, open to all students, and located in Hunt library. You can make tutoring appointments directly on the GCC website: http://www.cmu.edu/gcc. You may also visit the GCC website to find out about communication workshops offered throughout the academic year.

## EXPECTATIONS

### CLASS PARTICIPATION:

Although this class is primarily a lecture-style format, we really encourage class participation. Therefore, you will be rewarded for it. If you participate regularly in class by posing thoughtful questions, addressing another student’s questions, or responding with good comments, we will take this into account in computing the final grades. Thoughtful class participation that reflects your preparation and depth of thinking about the issues will be considered if your grade is near a letter-grade-boundary in calculation of the final course score. The course TA will keep indices of participation to keep things objective.

### RECORDING IN CLASS:
Classroom activities may be taped or recorded by a student for the personal use of that student only, but may not be further copied, distributed, published or otherwise used for any other purpose without the express written consent of Professor Behrmann. If you believe you are disabled and need to record or tape classroom activities, you should contact the Office of Equal Opportunity Services, Disability Resources to request an appropriate accommodation.

**ACCOMMODATION OF DISABILITIES:**

Please see Professor Behrmann within the first two weeks of classes to discuss any accommodations you may need. It is not acceptable to wait until the first evaluation to request accommodations; at that time it may be too late to make arrangements.

**USE OF MOBILE DEVICES, LAPTOPS, ETC. DURING CLASS:**

As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone’s learning experience if your cell phone, pager, laptop, etc. makes noise or is visually distracting during class. For this reason, **I ask you to turn off your mobile devices upon entering the classroom.** You are allowed to take notes on your laptop (although see above), but **you must turn off the sound** so that you do not disrupt other students' learning. **If you are using a laptop, please sit in the back row(s) so that other students are not distracted by your screen.**

See these papers for latest research on adverse effects of laptops in classroom:

- **Last**, with respect to laptop usage in class. I discourage the use of laptops in class. I recommend that you look at the following articles. The abstracts are pasted below.


Recently, a debate has begun over whether in-class laptops aid or hinder learning. While some research demonstrates that laptops can be an important learning tool, anecdotal evidence suggests more and more faculty are banning laptops from their classrooms because of perceptions that they distract students and detract from learning. The current research examines the nature of in-class laptop use in a large lecture course and how that use is related to student learning. Students completed weekly surveys of attendance, laptop use, and aspects of the classroom environment. Results showed that students who used laptops in class spent considerable time multitasking and that the laptop use posed a significant distraction to both users and fellow students. Most importantly, the level of laptop use was negatively related to several measures of student learning, including self-reported understanding of course material and overall course performance. The practical implications of these findings are discussed.

  Also see: [Logged In and Zoned Out: How Laptop Internet Use Relates to Classroom Learning](https://www.researchgate.net/publication/341855782)

  *Susan M. Ravizza, Mitchell G. Uitvlugt, and Kimberly M. Fenn (2017)*

Although laptops can be important learning tools, they may also be a source of distraction. Students enrolled in an introductory psychology course logged into a proxy server at the beginning of class. This server tracked students' Internet usage and the number of http requests they made during each lecture. Students' final cumulative exam grade was used as an indicator of their classroom performance. After accounting for intelligence, motivation, and interest, nonacademic Internet usage (e.g., using social media, online shopping, and watching videos) was found to be inversely related to students' class performance. Accessing the Internet for academic purposes (e.g., visiting the course website, looking at Wikipedia) did not benefit classroom performance.
**REGRADING:**
We take a great deal of care to ensure that grading is consistent, accurate and fair. If you wish to request review of your quiz or exam, you must do so in writing to the course instructor (Prof Behrmann). In this request, please indicate the question number and articulate, in detail, the case for your issue. Please bring a hard copy of this request to class with you and turn it in to the instructor. She will regrade your entire exam. Note that there is the possibility that additional errors on the exam, not noticed in the first round of grading, may be discovered.

**ZERO TOLERANCE OF VIOLATIONS OF ACADEMIC INTEGRITY:**
Any form of cheating will immediately earn you a failing grade for the entire course. By remaining enrolled, you consent to this policy. I will seek the harshest penalties under CMU’s policy on “Standards for Academic and Creative Life” and “Cheating and Plagiarism” in the Student Guidebook. Please become familiar with the CMU guidelines on academic integrity. You are responsible for learning what constitutes a violation of academic integrity and adhering to these guidelines. See [http://www.cmu.edu/academic-integrity](http://www.cmu.edu/academic-integrity)

**HOW TO GET HELP:**
Since there is both an instructor and a grad TA for this course (as well as undergrad TAs), you might wonder whom to see for help. Here are some general guidelines:

**Clarifications about lecture material:** Please come to class prepared to ask questions. I will be happy to review previous material and answer questions any time. If you are hesitant to ask in class, please email your question to the course TA.

**Questions about your grade:** Please make an appointment to meet the course TA outside of class and you can also go to office hours.

**General academic questions:** The instructor and TAs are happy to answer general academic questions such as “how can I get involved in neuroscience research?” If you are interested in research, our recommendation is to browse the faculty web pages in relevant departments (Psychology, Biological Sciences, Center for the Neural Basis of Cognition, Neurosciences, Neurobiology) at CMU and the University of Pittsburgh. Get a sense of the kind of research that interests you this ways and bring these ideas to us. We can help you to make contact with relevant labs.

**A note about email.** Please be advised that your instructors will do their best to answer emails within 48 hours (weekends may take a bit longer), but do not expect to receive responses immediately. Plan accordingly by reviewing the material early so that there is time to ask questions well before the examinations and quizzes. When contacting the TA, please state the nature of your questions and include your availability to meet for the next week. She will determine whether she or the course instructor would be most appropriate to field your question.

"You can get help from teachers, but you are going to have to learn a lot by yourself, sitting alone in a room." — Dr. Seuss

"Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn."

— Herb Simon
Nobel Laureate, Carnegie Mellon University

85-219 Biological Foundations of Behavior
Week #1
_readings: Chapters 1-2 from textbook_

Jan 18 (W)
Lecture 1: Course Introduction

_No class Jan 23 (sorry, have to go to NIH in DC)_

Jan 25 (W)
Guest visits to describe Research Requirement (20 minutes). Don’t miss this or you will need to make up the session on your own time...
Lecture 2: This Is Your Brain...

Week #2
_readings: Chapters 3-4 from textbook_

Jan 30 (M)
Lecture 3: Organization of the Nervous System and measuring Brain and Behavior

Week #3
_readings: Handout on dissection_

Feb 1 (W)
Lecture 4: _LAB #1_ – Dissection of the Sheep Brain

Week #4
_readings: Chapter 4 and 5 from textbook_

Feb 6 (M)
Lecture 5: The Action Potential, _QUIZ #1_

Week #5
_readings: Chapter 4 and 5 from textbook_

Feb 8 (W)
Lecture 6: Communication Among Neurons

Feb 13 (M)
_readings: Chapter 6 from textbook_
Lecture 7: Psychopharmacology: This is your brain on drugs

Week #6
Feb 15 (W):
Lecture 8: **EXAM #1**

Feb 20 (M):
*Readings: Chapter 9 from textbook*
Lecture 9: Intro to Perception & **LAB #2**

**Week #7**

Feb 22 (W)
Lecture 10: Vision, Part 1: an example sensory system

Feb 27 (M)
Lecture 11: Vision, Part 2: examples of neural computation

**Week #8**

March 1 (W)
Lecture 12: Vision, Part 3: examples of cortical processing, **QUIZ #2**

**Week #9**

March 6 (M)
Lecture 13: **EXAM #2**

March 8 (W)
*Readings: Chapter 10 from textbook*
Lecture 14: Audition: common principles (and differences) from another system

**Mid-semester grades due 3/13**
**Spring break till 3/17**

**Week #10**

*Readings: Chapter 14 from textbook*

March 20 (M) Elliot
Lecture 15: Learning & Memory, Part 1

March 22 (W) Elliot
Lecture 16: Learning & Memory, Part 2

**Week #11**

*Readings: Chapter 15 from textbook (Section on asymmetry)*

March 27 (M)
Lecture 17: Cerebral Asymmetry
March 29 (W) **No class**

**Week #12**

*Readings: Chapter 10 (Section on language); Chapter 11 from textbook*

April 3 (M)

*Lecture 18: Language; QUIZ #3*

April 5 (W)

*Lecture 19: Action & Motor Control*

**Week #13**

April 10 (M)

*Lecture 20: EXAM #3*

**No class April 12: Passover**

**Week #14**

April 17 (M)

*Readings: Chapter 12 from textbook*

Lecture 21: Motivated Behavior

April 19 (W)

*Readings: Chapter 16 from textbook*

Lecture 22: What Happens When the Brain Misbehaves?

**Week #15**

April 24 (M)

*Readings: Chapter 12 from textbook*

Lecture 23: Social Neuroscience; **QUIZ #4**

April 26 (W)

*Readings: Chapter 13 from textbook*

Lecture 24: Sleep

**May 1: Study day**

**May 3: EXAM #4**