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PSY351A: Advanced Biopsychology

Fall 2016

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| **Instructor:** | Matthew McMurray, PhDAssistant ProfessorDepartment of Psychology Office: Psychology, Room 221  E-mail: matthew.mcmurray@miamioh.edu | **Graduate Assistant:** | Dani Tapp Graduate Student Department of Psychology Office: Psychology, Room 123Email: tappdn@miamioh.edu |

# **Class Meeting Location and Times**

Times: MWF 8:30am - 9:45pm

Location: 227 Psychology Building

Note: Occasionally, class sessions will be held in the behavioral neuroscience laboratories (basement of Psychology Building) to facilitate laboratory exercises. Notes will be posted on Canvas the day prior, and a note will be posted on the door of 227 when this occurs. Additionally, announcements will be made in class.

# **Instructor Office Hours**

Times: Mondays 3-5pm or by appointment

Location: Dr McMurray’s office is located on the second floor of the Psychology Building, Room 221. He maintains an active research laboratory. Therefore, on occasion, his office hours will be held in the Behavioral Neuroscience laboratories (basement of Psychology Building). He will send an email and leave a note on his office door in that case.

Note: Dr McMurray strongly encourages each of you to stop by early and often. Not only will this help you better understand this difficult material, but it also lets him get to know you and get feedback on the course during the semester.

# **Graduate Assistant Office Hours**

Times: Tuesdays 8-10am or by appointment

Location: Dani’s office is on the first floor of the Psychology building, Room 123.

Note: Dani should be your first contact point if you have questions or concerns. If she is unable to satisfactorily answer your question, then please do not hesitate to come see Dr McMurray during office hours (or by appointment).

# **Course Description**

Please note: this class requires experimentation with live laboratory animals (rats) and preserved tissue.

As you likely remember from PSY251, Behavioral Neuroscience (aka biopsychology) represents the merging of Psychology and Biology. At its core, Behavioral Neuroscience seeks to explain complex behaviors by the physiological processes that underlie them. To accomplish this, the field relies on a huge variety of research methods, from behavioral to electrophysiological and molecular biology. During the semester, you will learn about how these methods are applied to the study of biopsychology through real laboratory experiences. Through these experiences, you will gain a significant understanding of the nervous system, how it is organized, functions, and controls behavior. Additionally, you will gain valuable (and in many cases necessary) skill in research methods and lab animal handling.

# **Learning Outcomes**

1. Describe the locations and major functions of discrete brain regions and parts of the neuron
2. Collaborate in small groups to collect real biopsychology data and analyze results within a laboratory research setting
   1. Demonstrate how neurons communicate using chemical and electrical signals
   2. Apply the above knowledge to control behavior by electrical and chemical manipulations of the associated neural circuits
   3. Manipulate behavior through exposure to drugs
   4. Employ histochemical staining techniques to demonstrate the importance of single neurons in the control of behavior
3. Acquire small animal handling experience
4. Become proficient in dissemination of research knowledge
   1. Read and critique scientific manuscripts, perform literature searches, develop hypotheses.
   2. Develop scientific writing skills through the creation of lab reports
   3. Present research findings in small groups

# **http://www-fp.pearsonhighered.com/assets/hip/images/bigcovers/0205994709.jpgRequired Text**

There is no book associated with the course. All required readings & media will be available via Canvas. You are responsible for completing each reading by the beginning of class on the date the reading is assigned and bringing a digital or printed (preferred) copy of the reading to each class. For supplemental background readings, I suggest Pinel, JP (2013) Biopsychology, 9th Edition. Upper Saddle River, NJ: Pearson Education, Inc. (pictured to the right).

# **Evaluation**

Attendance (100pts): This course is designed around practical laboratory experiences; therefore, attendance at all class meetings is mandatory. Failure to attend a class will result in a 10pt deduction from your attendance grade.

Participation (100pts): Like attendance, participation in all laboratory exercises is mandatory. Students will work in small groups for each laboratory exercise, and each student is expected to contribute to the exercise. At the end of the semester, group-mates will grade each other, and these scores will be factored into each person’s final grade.

Pop Quizzes (5pts each, 25pts total): While there will be no regular reading assignments, occasionally you will be asked to read an article or watch a video prior to attending class. Pop quizzes on five of these assignments will be given at the start of the following class. Each quiz will be multiple choice and should take no longer than 10 minutes to complete. Students arriving late to class will not be allowed to complete the quiz, and no make-ups will be given.

Group Presentations (25pts each, 75pts total): Each dissection group will be required to make three brief presentations (30 minutes) during the course of the semester. See the calendar below for topics and dates. Details on presentation format will be provided in class.

Neuroanatomy Practicum (100pts): During the semester, we will be dissecting sheep brains in small groups (3) to learn basic neuroanatomy. At the completion of the dissection exercises, each individual will be required to complete a practicum, which asks students to identify labeled structures on a set of instructor-dissected brains, and describe its function. This exercise is to be completed by each individual, and should be approached like a traditional exam.

Lab Reports (100pts each, 300pts total): After completion of each laboratory exercise, students will submit a lab report detailing their experiences. Each report should include and Introduction, Methods, Results, Conclusions, and Personal Notes sections. Each lab report should be no more than 5 pages. All Lab Reports will be due by midnight on the assigned deadline (see schedule below). More details on these reports will be given in class.

Final Exam (100pts): During the scheduled final exam period, students will complete a final cumulative exam. More details on this will be discussed in class.

Final Grades: The scores of all score-able course materials will be summed, and then this score will then be divided by the total number of points possible for the semester (800) to generate your final grade. Final grades will be earned according to the following scale:

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| ***Total % Grade***  100% A+  93 – 99% A  90 – 92%       A- | ***Total % Grade***  87 – 89%       B+  83 – 86%        B  80 – 82%       B- | ***Total % Grade***  77 – 79%       C+  73 – 76%        C  70 – 72%        C- | ***Total % Grade***  67 – 69%        D+  63 – 66%         D  60 – 62%        D-  <59%       F |

# **Academic Dishonesty**

Academic Integrity is at the heart of the mission and values of Miami University and is an expectation of all students. As the [Code of Love and Honor](http://www.miamioh.edu/iammiami) states, “We stand for honesty, integrity, and the importance of moral conduct.” This is an expectation for all Miami community members. Maintaining academic integrity is a reflection of your character and a means of ensuring that you are achieving the outcomes of this course and that your grades accurately reflect your learning and understanding of the course material.

Both Miami University and the Psychology Department are dedicated to providing a learning environment based not only upon academic excellence, but academic integrity as well. In this course it is expected that you will adhere to all Miami University guidelines regarding academic misconduct. For more information about academic integrity, please review the [Academic Integrity Information Guide](http://miamioh.edu/integrity/student-resources/) and the [Policy](http://blogs.miamioh.edu/miamipolicies/?p=1994).

Academic dishonesty is defined as any activity that compromises the academic integrity of the institution or subverts the educational process. Examples of academic dishonesty include, but are not limited to:

1. Cheating: using or attempting to use or possessing any aid, information, resources, or means in the completion of an academic assignment that are not explicitly permitted by the instructor or providing such assistance to another student.
2. Plagiarism: presenting as one’s own work ideas, representations, or words of another person/source without proper attribution.
3. Fabrication: falsification, invention, or manipulation of any information, citation, data, or method.
4. Unauthorized collaboration: working with another individual or individuals in any phase of or in the completion of an individual academic assignment without explicit permission from the instructor to complete the work in such a manner.
5. Misrepresentation: falsely representing oneself or one’s efforts or abilities in an academic assignment.
6. Gaining an unfair advantage: completing an academic assignment through use of information or means not available to other students or engaging in any activity that interferes with another student’s ability to complete his or her academic work.

Attempts to engage in any of the above actions will be treated the same as completed acts. Any suspected instances of academic dishonesty will be handled under Miami University’s Academic Integrity policy found in [Part 1, Chapter 5 of the Student Handbook](http://blogs.miamioh.edu/miamipolicies/?p=1994). Please review this policy, and note that lack of knowledge or understanding of the appropriate academic conduct is not an excuse for committing academic dishonesty. Students who are found responsible for committing academic dishonesty will receive a sanction that ranges from a zero on the assignment to an F in the course, which could also include the AD transcript notation. Students who commit academic dishonesty twice will automatically be suspended from Miami. If you have questions about how to complete an assignment or what could constitute academic dishonesty for a particular assignment, please feel free to visit Dr McMurray during office hours. Dr McMurray also encourages you to meet with him if you suspect that another student in the course has engaged in academic misconduct.

# **Attendance, Missed and Late Assignment Policies**

To succeed in this class, you absolutely must attend all class meetings. There will be NO MAKE-UPS FOR IN-CLASS ASSIGNMENTS OR LABORATORY EXERCISES. If you miss the class for any reason, you will be assigned a zero for any missed assignments, as well as a reduction to your attendance score. Late Lab Reports will receive a 10% reduction per day late. If you know that your submission will be late, I encourage you to contact the instructor ahead of time to arrange for an extension if your circumstances warrant it. Aside from Lab Reports, no other late assignments will be accepted.

# **Students with Disabilities**

Miami University is committed to maintaining a barrier-free environment so that individuals with disabilities can fully access programs, courses, services, and activities. Students with disabilities who require accommodations for full access and participation in the course must be registered with Student Disability Services. Accommodations are available for students who have disabilities; however, accommodations can only be granted if requested through Student Disability Services (SDS). If you choose to disclose your disability to Dr McMurray to receive accommodations, SDS will provide you with a letter to present to Dr McMurray. This letter will confirm that you are registered with SDS and will list reasonable accommodations recommended by SDS. You should plan to meet with Dr McMurray during office hours ASAP to discuss the accommodations and make sure a plan is in place. Please notify Dr McMurray during the first week of class if you need any accommodation for the course, or immediately after a diagnosis has been made during the semester, so that the expectations for all parties are clear. It is YOUR responsibility to initiate this process.

# **Other Important Notes**

Dr McMurray will make every effort to post materials on Canvas prior to each class meeting. However, he cannot guarantee they will be posted in time for you to access them ahead of time. Additionally, the instructors reserve the right to make changes to course materials at any time, including after the content has been discussed in class. This allows for materials to be updated based on the amount of material covered, and helps the instructors remember the topics you have struggled with, so they know how better to present them in future semesters. Therefore, when studying, you are encouraged to use the most up to date versions of each set of notes. When new versions are posted, an announcement will be made on Canvas.

Cell phone use during class is prohibited. Students may be asked to leave if disruptions persist. Please put your phones into airplane mode before entering the classroom.

Laboratory Safety is of paramount importance. Students who endanger themselves, their classmates, or their research subjects may be asked to leave the classroom/laboratory at the discretion of the instructors. In this circumstance, the offending student(s) will receive a 0 for attendance for that day, and a 0 on any assignments they miss. Already completed assignments will be accepted. Behaviors that endanger others will not be tolerated, whether intentional or unintentional.

Communicating professionally (via email or otherwise) is one of the most important skills to develop in modern society. The instructors expect you to use the same respect in email or online that you would in the classroom (e.g., addressing emails to Dr. McMurray or Professor McMurray, saying “please” and “thank you”, etc). We also expect that you will consult this syllabus and the Canvas site for announcements *before*emailing any instructors. Canvas will be used to make important announcements about the course. You should therefore check this important communication channel at least daily. If you decide to email an instructor, and your email is justified, we will do our best to respond quickly (usually by the end of the next business day); however, because our ability to answer complex questions via email isn’t perfect, don’t be alarmed if we suggest that you ask a question in class or in office hours. Additionally, we may suggest this if we get the same question from multiple students. Instructors will not respond to email received after 9pm until the following morning, and longer delays may occur on weekends.

# **Course Schedule (subject to change):**

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| **Week** | | **Date** | **Topic** |
| **NEUROANATOMY AND PHYSIOLOGY REVIEW** | 1 | 29 Aug | Introduction and Course Overview |
|  | 31 Aug | Overview of Lab Safety (Jeff Johnson) |
|  | 2 Sept | Introduction to Sheep Brains and Navigation |
| 2 | 5 Sept | No Class (Labor Day) |
|  | 7 Sept | Protection of the Nervous System |
|  | 9 Sept | External Structures of the Brain |
| 3 | 12 Sept | Vascularization of the Brain |
|  | 14 Sept | Sensorimotor Systems |
|  | 16 Sept | Ventricular and Neuroendocrine Systems |
| 4 | 19 Sept | Emotion and Memory |
|  | 21 Sept | Reward, Motivation, and Action |
|  | 23 Sept | Dissection wrap-up and review |
| 5 | 26 Sept | **Neuroanatomy Practicum** |
| **BEHAVIORAL OBSERVATION** |  | 28 Sept | Lab Reports and Presentations |
|  | 30 Sept | Literature Searches (Stephen Cox) |
| 6 | 3 Oct | Animal use for laboratory research (Neal Sullivan) |
|  | 5 Oct | Overview of Animal Models and Animal Handling |
|  | 7 Oct | Surgical Observation |
| 7 | 10 Oct | Group Presentations on Animal Models |
|  | 12 Oct | Group Presentations on Animal Models |
|  | 14 Oct | No Class (Fall Break) |
| 8 | 17 Oct | Behavioral Shaping |
|  | 19 Oct | Lab 1: ICSS Shaping Lab |
|  | 21 Oct | Lab 1: ICSS Rate-Frequency Curve Estimation |
| 9 | 24 Oct | Lab 1: ICSS Data Analysis |
| **BEHAVIORAL PHARMACOLOGY** |  | 26 Oct | Synaptic Physiology Overview (Part I)  **Lab Report #1 Due** |
|  | 28 Oct | Synaptic Physiology Overview (Part II) |
| 10 | 31 Oct | Pharmacology Overview |
|  | 2 Nov | Group Presentations on Drugs |
|  | 4 Nov | Group Presentations on Drugs |
| 11 | 7 Nov | Lab 2: Open Field Test after Amphetamine |
|  | 9 Nov | Lab 2: ICSS Rate-Frequency Curve Shift |
|  | 11 Nov | Lab 2: OFT and Curve Shift Data Analysis |
| 12 | 14 Nov | Flex class (for catch-up, review, etc) |
| **CELLULAR / MOLECULAR NEUROSCIENCE** |  | 16 Nov | Overview of Cellular/Molecular Physiology  **Lab Report #2 Due** |
|  | 18 Nov | Group Presentations on Molecular Research Methods |
| 13 | 21 Nov | Group Presentations on Molecular Research Methods |
|  | 23 Nov | No Class (Thanksgiving Holiday) |
|  | 25 Nov | No Class (Thanksgiving Holiday) |
| 14 | 28 Nov | Lab 3: Open Field Test after DA Lesion |
|  | 20 Nov | Lab 3: Brain Slicing and Tissue Collection |
|  | 2 Dec | Lab 3: TH Immunohistochemistry |
| 15 | 5 Dec | Lab 3: Imaging and Quantification |
|  | 7 Dec | Lab 3: Histology Data Analysis |
|  | 9 Dec | Course Wrap Up and Celebration  **Lab Report #3 Due** |
|  |  | TBD | **Final Exam** |