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PSY620A

Functional neuroanatomy of the prefrontal cortex

Fall 2019

**Instructor:** Matthew McMurray, PhD

Assistant Professor

Department of Psychology

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# **Class Meeting Location and Times**

Times: M 12:00 PM - 2:40 PM

Location: 244 Psychology Building

# **Instructor Office Hours**

Times: 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.

# **Course Description**

The prefrontal cortex (PFC) has been implicated in a wide array of functions, from emotional regulation to executive action, subjective value estimation, and even action planning. Given its wide array of cognitive roles, it naturally has a very complex structure, with multiple subregions contributing distinct and overlapping elements to our behavior and cognition. The emphasis of this seminar is on its role in decision-making and executive control, which are some of its most studied functions. The course will be divided into a number of blocks, each focused on a different part of the PFC, covering its anatomy (afferents/efferents, local structure, etc), and discussing both review papers and original research on its role in the previously-mentioned domains. This seminar will integrate findings from both human and animal research to broaden our perspectives on each subregion, as well as our methodological and theoretical backgrounds.

# **Learning Outcomes**

1. Describe the locations and major functions of each subregion of the prefrontal cortex
2. Understand neuroscience research from both human and animal studies
3. Develop a holistic model of how each component of the PFC interact to drive behavior and cognition
4. Become proficient in the sharing and creation of research knowledge
   1. Read and critique scientific manuscripts, perform literature searches, develop hypotheses
   2. Develop scientific writing skills through the creation of a final research project
   3. Present research findings in small groups

# **Required Text**

All required readings will be provided on Canvas, as well as suggested background readings. Additionally, students may find consultation of a textbook helpful, and are thus referred to the below, both of which are available at the library:

* Pinel, JP (2013) Biopsychology, 9th Edition. Upper Saddle River, NJ: Pearson Education, Inc.
  + This is an undergraduate level textbook and will provide a good overview for students that need a refresher on fundamental topics related to the course.
* Kandel, E; Schwartz, J; Jessell, T; Siegelbaum, S; Hudspeth, AJ (2012) Principles of Neural Science, 5th Edition. New York: McGraw-Hill, Health Professions Division.
  + This is a graduate level textbook that focuses on cellular and molecular neuroscience, and will serve as an excellent reference for these topics; however, it is very in depth and may be challenging for students without significant previous coursework in this field.

# **Evaluation**

Participation (100pts): Like attendance, participation in all discussions is mandatory. Occasionally, students may work in small groups, and each student is expected to contribute to group effort. Mid-semester feedback on participation will be provided upon request.

Paper Summaries (8pts each): Students will submit a summary of each class session’s readings. Each submission will include: 1) a single sentence summarizing the goal of the research; 2) the take home message for each figure (one sentence per figure); 3) a single sentence summary of the overall take home message of the paper. These will be graded as full credit (8pts), half credit (4pts), or no credit (0pts) based on instructor assessment of completeness and accuracy. Students should submit these on canvas by midnight the night before the relevant class. Students are not expected to submit summaries of the papers they are presenting. Additionally, the two lowest grades of this type will be dropped at the end of the semester. More details on these summaries will be provided in class.

Presentations (25pts each): Students will work in groups of 2 to present and lead discussions about research papers. Details on presentation format will be provided in class.

Final Project (100pts): Over the course of the semester, each student will develop an independent research project related to course concepts. As a final project, students will write an NIH style grant on their topic, which will be graded according to NIH standard review criterion. More details will be provided 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 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. Maintaining academic integrity is a reflection of your character and underpins your learning and understanding of the course material. Cheating will result in not learning what you need to learn in this class. Cheating now may lead to a future of cheating and other unethical behaviors to cover up the fact that you didn’t learn what you were supposed to learn. Try your best, manage your time well, ask questions, and be ethical.

Academic integrity is a partnership between me, as the instructor, and you, as the student. My role, as instructor of this course, is to facilitate learning and to provide you with clear guidelines and feedback to help you maintain your academic integrity. Your role in this course is to take responsibility for your learning and to complete all assignments in an honest manner and ask for clarification from me if you are unsure of how to do so.

Maintaining academic integrity means being serious about your learning, being responsible for your own learning, and making good choices about what kind of student you will be. I promise to uphold my end of our academic partnership in this class, and I hope you choose to do the same. I strongly suggest students review the [Student Guide to Academic Integrity](https://docs.google.com/document/d/1inl3BIeHvMYl-fQjDSy2duuYa1GnNjNEdkGlmc12Mrg/pub) frequently during the semester.

Any suspected instances of academic dishonesty will be handled under Miami University’s [Academic Integrity policy](http://miamioh.edu/policy-library/students/undergraduate/academic-regulations/academic-integrity.html) found in Part 1, Chapter 5 of the Student Handbook (<http://miamioh.edu/policy-library/students/undergraduate/academic-regulations/academic-integrity.html>). It is a student’s responsibility to read this policy. Please 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 contain the AD transcript notation. **Students who are found responsible for committing two acts of dishonesty (academic or Code of Student Conduct section 102 (Dishonesty)) automatically will be suspended from Miami University.**

If you have questions about how to complete an assignment ethically 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 DISCUSSIONS. 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 assignments will not be graded. 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.

# **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**

* 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.
* 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 (both towards the instructors as well as the other students).
* The Psychology Department's commitment to diversity and inclusion is a philosophy we embrace in all aspects of our department's duties. We hold this value especially high in the classroom, where our faculty and graduate students have the opportunity to demonstrate our dedication to meeting the high standards we have set for ourselves. Given Miami University's commitment to delivering high quality education, we expect our classrooms' climate to be warm, inclusive, and accepting of everyone's unique life experiences for both faculty and students alike. The classroom, above all else, is an environment designed to foster learning, and there is no better way to achieve that than by being seeking to understand the worldviews and backgrounds of everyone around us. As such, we expect everyone involved in their pursuit to teach and learn to help promote awareness of unique perspectives inside the classroom, and carry these lessons outside the classroom.
* Canvas will be used to make important announcements about the course. We therefore expect that you will consult this syllabus and the Canvas site for announcements *before*emailing any instructors. You should check canvas at least daily. If you decide to email an instructor, and your email is justified, the instructor will do his best to respond quickly (usually by the end of the next business day); however, because his ability to answer complex questions via email isn’t perfect, don’t be alarmed if he suggests that you ask a question in class or during office hours. Additionally, he 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/holidays. Work/life balance is important.

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

Note: The number of each reading denotes the group number presenting. Readings without numbers are background readings.

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| **Week** | **Date** | **Topic** | **Readings Due** |
| 1 | 26-Aug | Introduction and Overview of PFC Anatomy | Carlén 2017  Laubach et al 2018 |
| 2 | 2-Sep | NO CLASS!!! (Labor Day) |  |
| 3 | 9-Sep | Attention | 1. Gregoriou et al 2014  2. Nakajima et al 2019 |
| 4 | 16-Sep | Reward | 3. Otis et al 2017  4. Ferenczi et al 2016 |
| 5 | 23-Sep | Presentation and feedback on Specific Aims | - |
| 6 | 30-Sep | Memory I | 5. Namboodiri et al 2019  1. Kitamura et al 2017 |
| 7 | 7-Oct | Memory II | 2. Finn et al 2019  3. Euston et al 2007 |
| 8 | 14-Oct | Inhibition | 3. Lemire-Rodger et al 2011  5. Yan et al 2019 |
| 9 | 21-Oct | No Class |  |
| 10 | 28-Oct | Decision-Making I | 1. Hunt et al 2018  2. Fouragnan et al 2019 |
| 11 | 4-Nov | Decision-Making II | 4. Passecker et al 2019  4. Massi et al 2018 |
| 12 | 11-Nov | Grant Review Process |  |
| 13 | 18-Nov | Mock Review  Emotional Regulation I | 2 & 3. Dore et al 2017 |
| 14 | 25-Nov | Emotional Regulation II | 5. Wager et al 2008  1. Monosov & Hikosaka 2012 |
| 15 | 2-Dec | Other domains and considerations | 4. Bhanji and Delgado 2014  5. Dashtestani et al 2018 |
|  | 9-Dec | **No class, but final grants due by 11:59pm** |  |