

**Laboratory Methods in Behavioral Neuroscience**  
**NEUR 461-004 / PSYC 592-001/ PSYC 461-009**  
**Fall 2012**

**Instructor:** Dr. Jennifer Brielmaier

**Class time:** Wed. 1:30-4:10 pm

**Class location:** Robinson A206, DK 2035

**Office hours:** Tues. 9:30-10:30 am

**E-mail address:** jbrielma@gmu.edu

**Office phone #:** 703-993-1469

**Emergency phone #:** 703-993-1384 (Dept.)

**Office location:** DK 2063

**Course Description:**

The primary goal of this course is to provide advanced undergraduate and beginning graduate students a useful grounding in behavioral neuroscience research techniques. Laboratory work, to be completed in groups, will include surgical, histological and behavioral techniques. Proper use and handling of animals, ethical issues, evaluation of neuroscience literature, experimental design and data analysis are addressed. This course requires working with laboratory rodents.

**Required Text:** None

**Required Readings:** Available on Blackboard

**Course Objectives:**

As a result of completing work in this course, students will:

- Become familiar with behavioral neuroscience laboratory procedures and safety, issues of animal ethics, and proper use and handling of animals for neuroscience research.
- Employ behavioral techniques to assay learning and memory abilities, depression- and anxiety-related behaviors, and locomotor activity in rats.
- Employ histological techniques to prepare rat brain sections for neuroanatomical observations.
- Gain skills in searching for evaluating current neuroscience research.
- Learn tools for appropriate acquisition and analysis of behavioral neuroscience research data.
- Work with fellow students to conduct a self-designed independent project using acquired behavioral neuroscience techniques.
- Write an accurate and concise report of scientific findings in journal article format.

**Assignments:**

- **Readings:** Assigned readings will include lab protocols, textbook chapters, and journal articles. These readings will be distributed via Blackboard and/or GMU email. Successful and efficient labs depend on each of you coming to lab prepared. This means that you have to complete the readings **BEFORE** you come to lab. You don't need to understand every word or procedure, but you need to have a clear idea of the overall plan and/or the important concepts addressed.
- **Completion of Required Training:** In accordance with OSHA, NIH's Office of Laboratory Animal Welfare, and the National Research Council, students in this laboratory course are required to complete the following two lab safety training courses: 1) Animal and Vivarium Safety and 2) Laboratory Safety Orientation. These courses are offered through the Environmental Health & Safety Office (<http://ehs.gmu.edu/>). The GMU Office of Research Integrity and Assurance also requires that students complete on-line training in use of animals in research provided by the Collaborative Institutional

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Training Initiative (CITI). Information on how to sign up for the training courses will be provided in class. Completion of these training courses will count for a total of 10% of the final grade.

- **Participation:** Your grade for this course will include a “participation score” ranging from 0-45 points (0-3 points per class meeting). A score of 3 points will be given to a student who reports to lab on time, is prepared by having completed the readings ahead of time, and actively participates in all lab activities. A score below 3 points will be given to a student who demonstrates poor effort in a given lab session (e.g. arriving late, being unprepared, not actively participating in lab activities, disrupting other students, failing to cooperate, leaving lab before all the work (including cleaning) is done). The participation score will count for a total of 30% of the final grade.
- **Mock Data Analysis Exercise:** After being introduced to basic procedures for analyzing behavioral data using SPSS software, students will work individually outside of class to perform analyses of mock datasets. SPSS is installed on all computers available in the computer labs located in Innovation Hall (Rm. 301) and the Johnson Center (Rm. 342). For more information on the computer labs go to <http://doit.gmu.edu/index.html>. This assignment will count for a total of 10% of the final grade.
- **Research Project:** Students will work in groups to design, conduct and write up an original research project using behavioral neuroscience techniques covered in class. Students will work on this project throughout the semester, with specific due dates for individual sections of the project (see schedule below). Final projects will adhere to *Journal of Neuroscience* guidelines for writing a manuscript. Detailed information about this project, including a grading rubric, will be distributed. The research project will account for a total of 50% of the final grade.

**Attendance and Makeup Policies:**

- **Attendance:** Attendance *per se* is not part of your grade for this course. However, arriving to class late and/or failing to attend class will adversely affect your participation grade and will interfere with your ability to complete the final research project. With that being said, I understand that emergencies do come up. If you must miss a lab, arrive late, or leave early, please let your fellow group members and me know in advance via email or phone. **NOTE: You are responsible for all announcements and any syllabus modifications made in class each week whether you are present or not.**
- **Makeups:** Lab space availability and class time are limited, and a large breadth of material needs to be covered each week. Thus, lab activities cannot be made up outside of class. Assignments cannot be postponed without penalty unless you have obtained my consent **in advance** or unless you have written medical documentation. Assignments turned in late will carry a grade penalty of 10% per day. If an assignment is not turned in within 10 days of the original due date, a grade of 0 will be given for the assignment. Incomplete (IN) grades will be assigned only in cases of compelling and documented need, in accordance with policies set forth in the University Catalog.

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**Grading Breakdown:**

Training Course Completion (10%) + Lab Participation (30%) + Mock Data Analysis (10%) + Research Project (50%) = 100%

Grades will be assigned based on the following scale:

A+ 97% or above	B+ 87-89%	C+ 77-79%	D 60-69%
A 93-96%	B 83-86%	C 73-76%	F 59% & below
A- 90-92%	B- 80-82%	C- 70-72%	

**Official communications via GMU email:**

Mason uses electronic mail to provide official information to students. Examples include communications from course instructors, notices from the library, notices about academic standing, financial aid information, class materials, assignments, questions, and instructor feedback. Students are responsible for the content of university communication sent to their Mason email account, and are required to activate that account and check it regularly.

**Technology statement:**

Required knowledge of technology for this course includes ability to retrieve additional materials sent via email to your GMU address and/or posted on Blackboard. Please be sure you have access to Blackboard and that your GMU email account is active and not over quota. I will post relevant information and documents via the latest version of Microsoft Office, so make sure to have the latest version of office or download the converter in order to read all important documents.

**Special Needs:**

Every effort possible will be made to accommodate students with a disability or other special needs. If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

**The GMU Honor Code will be strictly enforced.** Cheating and plagiarism will not be tolerated and will be reported to the University Honor Board and/or penalized. Plagiarism is defined as using another's work (e.g. words or ideas) without giving proper credit. Sources of information used in the final written research project must be properly cited so as to avoid plagiarism. The instructor for this course reserves the right to enter a failing grade to any student found guilty of an honor code violation.

**Add/drop deadline:**

Last day to add – September 4<sup>th</sup>

Last day to drop – September 26<sup>th</sup>

There is also an elective withdrawal option for undergraduate students that will be from October 1-26. I strongly suggest that you speak with your academic advisor before choosing this option.

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**Tentative Schedule (subject to change based on lab space availability)**

<b>Date</b>	<b>Topic</b>	<b>Objectives</b>	<b>Readings/ Assignments</b>
August 29	Introduction/ General Lab Policies	General lab rules and safety Animal handling, care, identification	Carson & Hladik Ch. 4  Module: "How to Read a Scientific Paper"  <b>Sign up for EHS training courses</b>
September 5	Chem Lab Intro	Laboratory math Chem lab rules and safety Mixing and pH'ing solutions Demo/practice saline injections	Carson & Hladik Ch. 5 pH meter instructions  <b>CITI Training Certificates Due</b>
September 12	Rodent Behavioral Testing I	Learning & memory tasks  Continue practice handling and injections	Logue et al. 1997 Hopkins et al. 2011
September 19	Rodent Behavioral Testing II	Anxiety & depression-related behaviors  Continue practice handling and injections	Doremus et al. 2004 Mechan et al. 2002 Castagne et al. 2011
September 26	Data analysis & statistics  Brain extractions	SPSS demo  Practice brain extractions	Field SPSS manual  Holson et al. 1992
October 3	Brain tissue perfusions	Saline perfusion demo/practice Prepare Golgi-Cox solution	Bear pp. 26-27  Golgi-Cox staining protocol  <b>Research project idea due</b>
October 10	Histology: Golgi- Cox staining	Saline perfusions and brain extractions  Brains into Golgi solution	Szczepanik et al 1996  McDonald et al. 2005
October 17	Histology: Cresyl violet staining  Brain tissue slicing: cryostat	Introduction to other stains Make cresyl violet stain  Demo/practice cryostat slicing	Cresyl violet protocol Carson & Hladik pp. 64-65  <b>Research project Introduction section due</b>
October 24	Brain tissue slicing: vibratome	Golgi brains into sucrose  Demo/practice vibratome slicing	<b>Mock data analysis due</b>

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October 31	Brain tissue slicing	Vibratome slicing of Golgi brains  Continue practice cryostat slicing	<b>Research project methods section due</b>
November 7	Staining and coverslipping: Golgi-Cox	Golgi stain and coverslipping	Carson & Hladik p. 129
November 14	Staining and coverslipping: cresyl violet	Perform cresyl violet stain and coverslipping	<b>EHS certifications due</b>
November 21	<i>Thanksgiving Break</i>	<i>NO CLASS</i>	
November 28	Research projects  Visualization of stained tissue	Collect behavioral data  NeuroLucida/light microscope demo	Carson & Hladik p. 54-57
December 5	Research projects  Visualization of stained tissue	Collect behavioral data  NeuroLucida/light microscope demo	
December 12	Final exam day (no exam)		<b>Final project due 1:30 pm</b>