

San José State University  
Department of Psychology  
PSYC/BIO 129, Neuroscience, Sec. 03  
Fall 2024

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**Office Hours:** Thurs. 2:00 - 3:00PM (DMH 317) or by appointment  
**Class Days/Time:** Tues./Thurs. 3:00 - 4:15PM  
**Classroom:** Clark Hall 238

**Prerequisites:** Either PSYC 030 and 3 units of biology, or 9 units of biology

### **CANVAS and MYSJSU Messaging**

Copies of some course materials such as the syllabus, major assignment handouts, etc. may be found on my on Canvas. Messages to the class may be sent through Canvas or MYSJSU.

### **Course Description**

Neuroscience is defined as the study of the nervous system. This field comprises several related disciplines including: neuroanatomy, neurochemistry, neuroendocrinology, neuropathology, pharmacology, physiology, and immunology. The united efforts of such disciplines have produced a better understanding of the ultimate function of the nervous system and behavior. This course will examine findings produced by these efforts. It will involve examining specific topics and research methods in detail.

### **Course Goals and Student Learning Objectives**

#### **Learning Outcomes**

More specific course outcomes have been outlined in the *Summary of Events* following each quiz and exam (see below). Course and program learning objectives are as follows.

#### Course Learning Outcomes (CLOs)

Upon successful completion of this course, Psych/Bio 129 students will be able to:

CLO1 – *Students will be able to* –identify, describe, and communicate the major concepts related to basic neuroanatomy, neurophysiology and psychopharmacology. Assessment for this will be in quiz 1, midterm I, and in parts of quiz 2 and midterm II.

CLO2 – *Students will be able to* –describe, and communicate the major transduction mechanisms, neuroanatomical pathways and theoretical perspectives associated with vision and nonvisual sensory

systems, motivational systems and learning processes. Assessment for this CLO will be conducted in quizzes 2 and 3, and midterms I and II.

CLO3 – *Students will be able to* – identify, describe, and communicate experimental approaches and associated empirical findings for various methodological approaches in neuroscience. Assessment for this CLO will be conducted primarily in Midterm I, but also in quizzes 1 - 3, and midterms II and III.

CLO4 – *Students will be able to* – think critically and creatively about neuroscience approaches to address issues related to behavioral and mental health processes. This CLO will be assessed in essay-type questions on primarily on the final exam.

CLO5 – *Students will be able to* – apply neuroscience principles to individual, interpersonal and group behavioral and mental health issues. This will be assessed on the final exam.

### Program Learning Outcomes (PLO)

*Upon successful completion of the psychology major requirements...*

PLO1 – Knowledge Base of Psychology – Students will be able to identify, describe, and communicate the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology.

PLO2 – Research Methods in Psychology – Students will be able to design, implement, and communicate basic research methods in psychology, including research design, data analysis, and interpretations.

PLO3 – Critical Thinking Skills in Psychology – Students will be able to use critical and creative thinking, skeptical inquiry, and a scientific approach to address issues related to behavior and mental processes.

PLO4 – Application of Psychology – Students will be able to apply psychological principles to individual, interpersonal, group, and societal issues.

PLO5 – Values in Psychology – Students will value empirical evidence, tolerate ambiguity, act ethically, and recognize their role and responsibility as a member of society.

Goals for this course fall into three broad categories. Learning outcomes for the first part of the course are a general understanding of the philosophical issues driving much of contemporary neuroscience research; an understanding of mechanisms used during brain development, and students are expected to develop a firm hold on biological foundational knowledge as it relates to the central nervous system. The second part of the course will provide students with a detailed understanding of the sensory systems. Following the final section of the course, students should have an understanding of how neural systems contribute to various behaviors ranging from motivation to learning.

### **Required Texts/Readings**

**Text:** Bear, M. F., Connors, B. W., and Paradiso, M. A. (2016). *Neuroscience: Exploring the Brain* (4<sup>th</sup> ed.). Philadelphia, PA: Wolters Kluwer.

**Additional Reading and Resources:** Handouts will be provided to supplement reading. Check the website or Canvas when directed to do so.

Writing Assistance: [http://psychology.about.com/science/psychology/msub\\_writing.htm](http://psychology.about.com/science/psychology/msub_writing.htm)

Research and plagiarism assistance: <http://tutorials.sjlibrary.org/tutorial/index.html>

## Library Liaison

The SJSU librarian specializes in social sciences and may serve as a resource for the development of research ideas and for finding the most appropriate research materials.

## Classroom Protocol

To succeed in this course, attendance is critical. You should come prepared for class discussions with a completion of course readings. Students are responsible for keeping current on changes that may occur on the tentative schedule of events in the syllabus. Students are expected to maintain a level of professional and courteous behavior at all times.

## Cell phones and other electronic devices

You are to turn off cell phones and other electronic devices before the beginning of class.

## Communication with instructor

Use email, office hours, or class time. I will respond to emails M-F 9:00 – 5:00. Please allow 1-2 business days for a response, and be certain to be specific about the topic. For example, the subject line should include the course (129) and brief topic (e.g., appointment). Please note, [email is not a mechanism to get extensive help with course content or with papers](#). Please come to my office hours for these and other issues that require more discussion. [Also note that lecture notes \(or a lecture recap\) will not be emailed](#) to students. When a lecture is missed, it is your responsibility to get notes from a classmate.

## Consent for Recording of Class and Public Sharing of Instructor Material

University Policy s12-7, <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course.

- ◆ “Common courtesy and professional behavior dictates that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. This permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
- ◆ If you would like to record course lectures, please obtain permission from your instructor in writing (via email is ok) or orally and indicate whether you will record for the whole semester or on a class by class basis.
- ◆ “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor-generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent”.

## Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](#) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the [current academic calendar](#) web page located at [http://www.sjsu.edu/academic\\_programs/calendars/academic\\_calendar/](http://www.sjsu.edu/academic_programs/calendars/academic_calendar/). The [Late Drop Policy](#) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

## **Assignments and Grading Policy**

The requirements for this class include 3 quizzes, 4 examinations (3 midterms and a final exam), a paper topic (3%) and 1 research paper (12%). Each quiz is worth approximately 8% of your grade. The midterms and the paper each count 15% toward your final grade. The final exam will be worth a total of 15%.

Quiz format is objective (i.e., multiple choice, true/false, fill-in, identify, and match), and short answer. The objective portion will be provided on Canvas. Examination format is objective and essay. The final exam is scheduled for Wednesday 12/11 @ 2:45 PM.

Literature review research papers will be due on the last week of instruction (12/5). They must be at least 5 pages of text (excluding summary, references and cover page) and must be typed (double spaced) and in APA format. This assignment is designed to provide you with an opportunity to explore a particular topic of interest and to demonstrate what you've learned about neuroscience. You may research a particular topic, theory, or author. These are merely intended as examples of what is possible, and all topics must be preapproved by the professor. The paper topic assignment (due 10/10) is a one-page (maximum) description of your literature review research paper. This is to be double spaced with at least one reference (APA format). More will be said about these assignments in class.

## **Definition of a Credit Hour**

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities. As an example, the expectation of work for a 3-credit course is 150 minutes of direct faculty instruction and six hours of out-of-class student work each week.

## **Make-up Exams**

There will be **no early, late or make-up exams or work** (with the exception of a written medical excuse). Please check your schedule to ensure that you have no conflicts with the due dates. You may also review exams during office hours and by appointment.

## **Late Assignments**

Again, no extensions for assignments will be given except in cases of documented emergencies or serious illness.

## **Extra Credit**

A maximum of 8 extra credit points may be earned by attending research presentations, either professional conferences or departmental (Psychology or Biology Departmental sponsored). You may also review select movies. To receive credit, you must write a brief summary (1 page) of the each presentation or film (Due 12/5). All summaries are to be typed (double-spaced) with a title page referencing presentation. Point value per activity will be determined by the professor. There may also be extra credit opportunities in class.

## **University Policies**

### **Academic integrity**

Academic integrity is essential to the mission of San José State University. As such, students are expected to perform their own work (except when collaboration is expressly permitted by the course instructor) without the use of any outside resources. Students are not permitted to use old tests,

quizzes when preparing for exams, nor may they consult with students who have already taken the exam. When practiced, academic integrity ensures that all students are fairly graded. Violations to the Academic Integrity Policy undermine the educational process and will not be tolerated. It also demonstrates a lack of respect for oneself, fellow students and the course instructor and can ruin the university's reputation and the value of the degrees it offers. The [Student Conduct and Ethical Development website](http://www.sa.sjsu.edu/judicial_affairs/index.html) is available at [http://www.sa.sjsu.edu/judicial\\_affairs/index.html](http://www.sa.sjsu.edu/judicial_affairs/index.html).

Violators of the Academic Integrity Policy will be subject to failing this course and being reported to the Office of Judicial Affairs for disciplinary action which could result in suspension or expulsion from San José State University.

The following URL will take you to the SJSU library's plagiarism tutorial. If you have not yet completed this, it is worth your while to do so: <http://tutorials.sjlibrary.org/plagiarism/index.htm>

### **Campus Policy in Compliance with the American Disabilities Act**

*If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at <http://www.sjsu.edu/aec/> to establish a record of their special needs.*

### **Student Technology Resources (Check availability during COVID-19 SIP)**

Computer labs for student use are available in the Academic Success Center located on the 1<sup>st</sup> floor of Clark Hall and on the 2<sup>nd</sup> floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the Martin Luther King Library.

A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include digital and VHS camcorders, VHS and Beta video players, 16 mm, slide, overhead, DVD, CD, and audiotape players, sound systems, wireless microphones, projection screens and monitors.

### **Learning Assistance Resource Center (Check availability during COVID-19 SIP)**

*The Learning Assistance Resource Center (LARC) is located in Room 600 in the Student Services Center. It is designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. The center provides support services, such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. The [LARC website](http://www.sjsu.edu/larc/) is located at <http://www.sjsu.edu/larc/>.*

### **SJSU Writing Center (Check availability during COVID-19 SIP)**

The SJSU Writing Center is located in Room 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The [Writing Center website](http://www.sjsu.edu/writingcenter/about/staff/) is located at <http://www.sjsu.edu/writingcenter/about/staff/>.

Below is to provide a quick summary of important course events. I have also included a brief description of somewhat broad learning outcomes for each section. You may find this, along with the study guides, useful when preparing for quizzes and exams. A detailed schedule of events is also provided, but this may be subject to modification as the instructor deems necessary. You are responsible for recording any changes that may occur throughout the semester.

## **Summary of Events**

### **Quiz 1**

Date: Thursday Sept 5<sup>th</sup> (Due September 10<sup>th</sup>)  
Lectures: August 22 – Sept. 5<sup>th</sup>  
Outcomes: Demonstrate a clear understanding of structure and function of the CNS.  
Describe and compare neurons, glia and intraneuronal communication and the electrophysiology.

### **Midterm I**

Date: Thursday, September 19<sup>th</sup>  
Lectures: August 22 – September 19  
Chapters: Chapters 1-6; Handout  
Outcomes: Describe interneuronal communication  
Demonstrate a complete understanding neuron function, including pre- and post-synaptic mechanisms.  
Describe the biosynthetic pathway for neurotransmitters.  
Describe specific drug and neurotransmitter–receptor interactions, and some brain systems involved.

### **Quiz 2**

Date: Thursday Oct 3<sup>rd</sup> (Due Tuesday October 8<sup>th</sup>)  
Lectures: September 19 – October 3<sup>rd</sup>  
Outcomes: Describe epigenetics and the ontogenetic nervous system development.  
Demonstrate an understanding of basic neuroanatomy, and specific cases of brain damage to illustrate brain function. Describe properties of light and the anatomy of the retina.

## **PAPER TOPIC DUE 10/10**

### **Midterm II**

Date: Thursday, October 17<sup>th</sup>  
Lectures: September 19 – October 15  
Chapters: Chapters 7, 8, 9, 10, (11, 12 TBD)  
Outcomes: Describe the development of the nervous system and key neuroanatomical structures. Define Epigenetics and prenatal and postpartum effects.  
Discuss transduction of light and the nonvisual sensory systems, and primary and secondary sensory pathways.

### **Quiz 3**

Date: Thursday October 31<sup>st</sup> (Due Nov. 5<sup>th</sup>)  
Lectures: October 17 – 31  
Outcomes: How does pain differ from other sensory systems? What causes pain? What are key structures associated with the hypothalamus, and how does it use a negative feedback system? What are the diffuse neuromodulatory systems and where is the reinforcement and reward center in brain? TBD: Describe sleep. What is its function?

### **Midterm III**

Date: Tues, November 14<sup>th</sup>  
Lectures: October 17 – Nov. 14<sup>th</sup>  
Chapters: Chapters 12 (select pages), 15, 16, 17, 19, 18 (TBD select pages)

Outcomes:

- An understanding of specific motivations and the role of the hypothalamus
- Where are the reinforcement and reward centers in brain?
- What are the diffuse neuromodulatory systems?
- Describe sleep. What is its function? What causes sexual dimorphism?
- Understand neuroanatomy of emotion and how this relates to learning

## **Final Exam**

Date: Wednesday Dec. 11<sup>th</sup> 2:45 – 5:00 PM  
Lectures: All  
Chapters: All reading with particular focus on material following Midterm III

**Please note: Quizzes will be take-home tests and can be found on Canvas. This means you are on your honor when taking these quizzes. Your time is unlimited; however, you may not discuss the questions or responses with other individuals. Collaborative work will result in a zero for all.**

	Outcomes and Associated Points	
<b>Assignment</b>	<b>Approximate percent</b>	<b>Points</b>
Quizzes (3)	8% each	25 each (75 total)
Midterms (3)	15% each	45 each (135 total)
Paper (1)	12%	35
Paper Topic	3%	10
Final Exam	15%	45
<b>TOTAL</b>	<b>100%</b>	<b>300</b>

Grading Scale (300 points)		
<u>Total Points</u>	<u>Percentage</u>	<u>Grade</u>
269 – 300	90 – 100	A- to A+
239 – 268	80 – 89	B- to B+
209 – 238	70 – 79	C- to C+
180 – 208	60 – 69	D- to D+
179	less than 50	F

### REVISED Scheduled Events:

Week	Date	Reading (chapter)	Lecture	Activities
1	8/22	1, Handout (Beyond the Neuron...)	Intro/Expectations	Begin research for paper topics
2	8/27	1, 2	Neurons and glia: function and structure	Discuss the Beyond the Neuron Doctrine
	8/29	3	Electrophysiology	
3	9/3	3, 4	Electrophysiology	
	9/5	4	Electrophysiology	Quiz 1 (Chapters 1-4, Handout)

4	9/10	5	Synaptic Transmission/Receptor Characterization	Quiz 1 due
	9/12	5,6	Synaptic Transmission/Receptor Characterization	
5	9/17	6	Remaining /Receptor Characterization	
	9/19	6, 7	Midterm I	Chapters 1-6 and select readings
6	9/24	7 & Handout	Epigenetics	
	9/26	7, Handout (TBD)	Neuroanatomy, CNS Development	
7	10/1	9, 10	Neuroanatomy, CNS Development	
	10/3	9, 10	Sensory Systems: Vision	Quiz 2
8	10/8	8	Vision, Chemical Senses	Quiz 2 due
	10/10	12	Somatosensory	Paper topic due
9	10/15	12	Nociception	
	10/17		Midterm II	Chapters 7,8, 9,10,11,12
10	10/22		<i>SPRING BREAK</i>	
	10/24		<i>SPRING BREAK</i>	
11	10/29	12 (select pages),15, 16	Compete Nociception, Hypothalamus/ Limbic System	
	10/31	16 (22: TBA select pages)	Set Points, Motivated Behaviors	<b>Quiz 3</b>
12	11/5	16, 19	Stress, Sleep	Quiz 3 due
	11/7	19	Sleep	
13	11/12	12 (select pages),15, 16	Compete Nociception, Hypothalamus/ Limbic System	
	11/14		Midterm III	12 (select pages), 15, 16,19 (select pages)
14	11/19	16	Motivation	
	11/21	NO CLASS	<i>Conference</i>	
15	11/26	18	Emotion	
	11/28	24, 25	<b>THANKSGIVING</b>	<b>NO CLASS</b>



16	12/3	25	Learning and memory	
	12/5	22	Mental illness	PAPERS DUE EXTRA CREDIT (Due 5/12)
Wed	12/11	2:45 – 5:00 PM	FINAL EXAM	ALL

### Additional Information for the 129 Final Report (Due May 12<sup>TH</sup>)

The structure for your report is somewhat flexible, but it must include a summary, introduction, and a description of the methods, results and discussion. You also need a list of references (all in APA, of course!). As discussed in class, you may construct your final report as a 100w paper, so that there are essentially a series of chronologically-ordered article summaries. If this is your approach, you must state the rationale, background information and theoretical propositions in an introductory section. To complete your paper with the page limitations, you will also have to summarize some of the studies more than would be expected in a 100w paper. You must describe what was done in the studies that you have cited, but some detailed information (e.g., numbers of participants) should be omitted. You must also have a conclusion/discussion section which is your critical analysis of the work that you reviewed. This is where you tie everything together, and you discuss the imitations and the strengths of the research on your topic.

If you choose to organize your paper as a traditional research paper, it would read like a review article, which I'm sure you have come across in your research. You might organize your paper in this way and I've provided some additional example formats below. In all cases, the methods and results would be discussed, but they would greatly summarized.

To reiterate, for all papers, instead of an "Abstract", you should open your paper with a summary of your research. It should include a rationale, thesis, methods (e.g., humans, animals, tests?) general results, and final conclusion. Your paper is to be based on empirical research (5 references), and is to be at least 5 pages in length (please, no more than 10 pages). Your research report will be graded on content and clarity (first and foremost) and format. Remember APA! (See below.)

#### Checklist for an APA-style Literature Review Paper (refer to the 6<sup>th</sup> edition of the APA Publication Manual for reference)

\_\_\_\_\_ Title Page:

- Title: Capitals, informative, concise
- Author, institution, and date
- Page header and page numbers  
(on every page)

\_\_\_\_\_ Summary: Include of rationale, what was found and conclusion (as found in an abstract)

\_\_\_\_\_ Introduction:

- Title of paper on first page of text (this is a deviation from APA guide)
- Exposition of research topic (What will you be examining and why?)
- Theoretical reasoning leading to question or topic you are attempting to answer (Why is this topic important to study and what theory(ies) support the need to examine your topic)

\_\_\_\_\_ Literature Review

- Review and synthesis (integration) of relevant research (do not submit annotated bibliographies)
- Summary of relevant studies (what did others study, why, what did they find, what were the implications of their findings; make sure to tie this with the topic you are addressing)
- Coherence (not long winded), clarity (express ideas clearly, defining major concepts), and organization (easy to follow sequential flow; “outline” of paper presented early in the paper and the order is followed)

\_\_\_\_\_ Conclusion:

- Practical implications and applications of findings to other behaviors (What does it all mean? What was learned from this literature review? How is it important?)
- What is your analysis of the research?
- Additional research questions stemming from current study (What else needs to be examined that was not addressed explicitly in your literature review? Why might these questions be important?)

\_\_\_\_\_ References & Citations:

- Enough to support ideas and arguments (minimum of 5 empirical, peer-reviewed articles; more preferred)
- APA format (punctuation, spacing, accuracy)
- All citations referenced, all references cited (give credit where credit due)
- Appropriate credit to author(s) (no plagiarizing-- when in doubt it's better to over-cite than to under-cite)

\_\_\_\_\_ APA Format and Overall Form:

- Correct tense; noun-verb agreement; noun-pronoun agreement
- Grammar/Spelling/Typing Errors
- Punctuation
- Conciseness
- Cleanliness
- Quotations (correctly used in paper)
- Heading format
- Page numbers
- Staple on upper left corner of paper
- 1 inch margins all around, 12 point Font, Times New Roman, Double Spacing (**EVERYTHING**), Left Justify (except title page, header)

Below you will find a sample outline for a “traditional research paper”. This is meant only to provide an **example of a possible format**.

**Version 1**

- I. INTRODUCTION - (Providing rationale and background, leading to the thesis, stress-induced cortisol damages the hippocampus) –
- II. BODY – Research describing stress, cortisol and hippocampal atrophy
  - A. Earlier Work by Sapolsky (rodent model)
    1. Stress and cognition
      - a. stress and hippocampal-associated cognition
      - b. stress and hipp. volume loss
    2. Stress and Neuron Dysfunction
      - a. Neuron death

- b. Neuron atrophy
  - B. Recent Work by McEwen (human model)
    - 1. Stress-Brain Regions
      - a. fMRI and PTSD
      - b. fMRI and normal population, stress induction
    - 2. Postmortem Examination
      - a. cellular examination
  - C. Cognitive testing
    - 1. Virtual Morris Water Maze
    - 2. Morris Water Maze
- III. CONCLUSION
  - A. Analytical summary
    - 1. Rodent model
    - 2. Human work
    - 3. Most recent findings
  - B. Thesis reworded
  - C. Concluding statement