UNIVERSITY OF SAN FRANCISCO | College of Arts and Sciences

Annual Assessment Report AY23-24

REPORT DUE DATE: Nov 1, 2024

I. LOGISTICS

1. **Please indicate the name and email of the program contact person to whom feedback should be sent (usually Chair, Program Director, or Faculty Assessment Coordinator).**

Associate Professor Marisa Knight
Director of the Interdisciplinary Minor in Neuroscience
mrknight@usfca.edu

2. Please indicate if you are submitting report for (a) a Major, (b) a Minor, (c) an aggregate report for a Major & Minor (in which case, each should be explained in a separate paragraph as in this template), (d) a Graduate or (e) a Certificate Program

This is a report for the Interdisciplinary Neuroscience Minor

3. Please note that a Curricular Map should accompany every assessment report. Has there been any revisions to the Curricular Map?

No revisions have been made. Curricular Map appears below.

	PLO1	PLO2	PLO3
Courses X Program Learning Outcomes	Students will be able to describe the basic anatomy and physiology of the nervous system.	Students will be able to describe how the activity of the nervous system is related to behaviors (e.g., emotions, memory, mental illness).	Students will be able to critically evaluate the implications and limitations of neuroscientific research.
Courses			
BIOL 105/105L: General Biology	I	I	I
PSYC 270: Biological Psychology	I	I	I
BIOL 115/116: Survey of Human Physiology	I	I	I
BIOL 350/351: Comparative Animal Physiology	D	D	D
BIOL 333/334: Endocrinology	D	D	D
BIOL 340: Animal Toxicology	D	D	D
KIN 340: Neuroscience	M	M	M
BIOL 368: Neurobiology	M	M	M
PSYC 319: Cognitive Psychology	D	D	D
PSYC 326: Learning and Memory	D	D	D
PSYC 351: Human Neuropsychology	D	D	D
	Key: I = Introductory		
	D = Developing		
	M = Mastery		

II. MISSION STATEMENT & PROGRAM LEARNING OUTCOMES

Mission Statements (no changes):

The interdisciplinary field of neuroscience is one of the most exciting and rapidly growing areas within the sciences. Our interdisciplinary minor in neuroscience draws from traditional natural and social science areas to help students better understand the structure and function of the nervous system and how activity within the nervous system gives rise to behavior. The neuroscience minor provides an interdisciplinary approach to studying these relationships, encompassing elements of biology, chemistry, kinesiology, philosophy and psychology.

Program Learning Outcomes (no changes):

PLO 1: Students will be able to describe the basic anatomy and physiology of the nervous system.

PLO 2: Students will be able to describe how the activity of the nervous system is related to behaviors (e.g., emotions, memory, mental illness).

PLO 3: Students will be able to critically evaluate the implications and limitations of neuroscientific research.

2. **State the particular Program Learning Outcome(s) you assessed for the academic year 2023-2024.**

PLO 1: Students will be able to describe the basic anatomy and physiology of the nervous system.

PLO 2: Students will be able to describe how the activity of the nervous system is related to behaviors (e.g., emotions, memory, mental illness).

Assessment Schedule (Past Assessments):

The minor is comprised of different tracks, specialized for students from several different majors, and fluctuates in size (ranging from 70-150 since program assessment started). Because the minor director and department affiliates do not control the scheduling or staffing of courses within the minor, our program assessment relies on available courses with willing instructors.

The ongoing effort to work toward establishing a regular assessment program in our Neuroscience Minor program has continued with the collection of relevant materials, development of assessment measures and support from colleagues who teach courses in the minor.

The first assessment of the Neuroscience Minor was carried out in AY 2021/2022. It was a direct assessment of PLOs 1 and 2 for Biological Psychology (PSYC 270).

In AY 2022/2023 a direct assessment of PLOs 1 and 2 was carried out in Human Physiology (BIOL 115/116).

III. METHODOLOGY

For any program with fewer than 10 students: If you currently have fewer than 10 students in your program (rendering your statistical analysis biased due to too few data points), it is fine to describe a multi-year data collection strategy here. It would be important to remember that every 3 years, we would expect you to have enough data to conduct a meaningful analysis.

Please Note: There were only 6 Neuroscience Minor students available for this assessment. Results are reported, but a multi-year data collection strategy will be necessary to minimize the potential for statistical bias. We will continue to collect and aggregate data using the methodology described below to reach a sufficient sample size for an unbiased performance estimate.

Important: *Please attach, at the end of this report, a copy of the rubric used for assessment.*

The items developed for this measure are attached at the end of this report. The scoring criteria/rubric are reported in the Results and Major Findings Section below.

Methodology used (Major and Minor Programs):

This assessment relied on the collaborative efforts of myself and Professor Ed Munnich, our regular full-time course instructor for PSYC 319: Cognitive Psychology. Our prior history of assessments included core courses at the foundational level. Cognitive Psychology is an elective course that has not yet been assessed. Our findings therefore will provide insight into performance regarding PLOs #1 and 2, and also move us further toward our goal of including all of our courses into our assessment program.

To develop the assessment measure, Prof. Ed Munnich provided multiple choice exam questions with sound psychometric properties. The resulting item pool comprehensively sampled the content space of

the course. The items were then evaluated based on how well they measured program learning outcomes 1 and 2.

Item selection was carried out with the goal of providing effective evidence of student mastery and offering diagnostic value for the teaching and learning process. Item difficulty level was one consideration. Obvious wrong answers were not provided among the four choices to avoid conflating students' common sense with their mastery of course-specific knowledge and to avoid raising chance-level performance above 25% (i.e., 1 out of 4 choices), which would yield artificially inflated scores.

This test development process resulted in an instrument with 8 multiple choice questions, 4 of which assessed PLO #1 and 5 questions that assessed PLO #2.

The assessment was carried out during the last two weeks of the fall semester. The test started with a set of instructions and two questions regarding students' academic programs so that scores for Psychology minors could be isolated and analyzed separately from the larger dataset. The instructions assured students that their performance on the test would not affect their course grades. Students were instructed to work independently without consulting other sources. The test was administered to one section of Cognitive Psychology offered in Fall 2023. Out of a total of 33 students enrolled, there were 6 Neuroscience Minors. All but one of the Neuroscience Minors were Psychology Majors. One Neuroscience Minor was a Computer Science Major.

Data collection closed on December 6th, 2023.

The assessment rubric was set by considering the course level and its intended goal in the Neuroscience Minor curriculum. Cognitive Psychology is one of three Elective courses available to all minors. Our curricular map shows that this course aims to "develop" PLOs 1 and 2 (whereas higher level courses have the aim to "master" the PLOs). Our rubric classified student performance into the categories of:

9 correct items = complete mastery of the outcomes;

6-8 correct items = mastered most of the outcomes;

4-5 correct items = mastered some parts of the outcomes;

0-3 correct items = did not master outcomes at level intended.

IV. RESULTS & MAJOR FINDINGS

What are the major takeaways from your assessment exercise?

PSYC 319 is an elective course for Neuroscience Minors. The overall findings show strong evidence of mastery at the intended level, which was defined as mastery of most parts of the outcome (7-8 out of 8 items correct) to complete mastery of the outcome (9 out of 9 items correct).

For PLO #1 and #2, 100% of Neuroscience Minors (6 out of 6) demonstrated mastery at the intended level. The following tables show the aggregate data for PLOs 1 & 2 combined, and for each PLO separately. We were pleased to see our Neuroscience Minors mastering this learning outcome at the intended level, but also recognize the limitations inherent in the small sample size.

Combined PLO #1 and 2 – Mastery Level Percentage - PSYC 319 – Neuroscience Minors (N=6)

Level	% Total Sample
Complete Mastery	83.3% (5 students)
Mastered Most Parts	16.7% (1 student)
Mastered Some Parts	0%
Did not Master at Level Intended	0%

- *9 correct items=complete mastery of the outcome, 7-8 correct items=mastered most of the outcome, 4-6 correct items=mastered some parts of the outcome, 0-3 correct items=did not master outcome at level intended.

PLO #1 – Mastery Level Percentage - PSYC 319 – Neuroscience Minors (N=6)

Level	% Total Sample
Complete Mastery	83.3% (5 students)
Mastered Most Parts	16.7% (1 student)
Mastered Some Parts	0%
Did not Master at Level Intended	0%

- *4 correct items=complete mastery of the outcome, 3 correct items=mastered most of the outcome, 2 correct items=mastered some parts of the outcome, 0-1 correct items=did not master outcome at level intended.

PLO #2 – Mastery Level Percentage - PSYC 319 – Neuroscience Minors (N=6)

Level	% Total Sample
Complete Mastery	83.3% (5 students)
Mastered Most Parts	16.7% (1 student)
Mastered Some Parts	0%
Did not Master at Level Intended	0%

*5 correct items=complete mastery of the outcome, 4 correct items=mastered most of the outcome, 2-3 correct items=mastered some parts of the outcome, 0-1 correct items=did not master outcome at level intended.

To summarize, what we have learned is that the Cognitive Psychology Neuroscience Minor elective course is meeting our mission and PLOs #1 and 2 most of the time.

V. CLOSING THE LOOP

Response to the results

Once we have a sample size sufficient to carry out unbiased statistical inferential analysis, the findings will be shared with relevant faculty members of the Neuroscience Minor through Google Drive and email and feedback will be solicited. We are encouraged by the preliminary findings and look forward to incorporating this new assessment measure into future assessments.

Discussion of any significant feedback from your previous year's report and how your department/program responded to that feedback.

Committee responses to the 2022-2023 assessment of PLOs #1 and 2 with a direct assessment of BIOL115/116 were positive and highlighted that our mission statement, PLOs, and curricular map are well constructed and provide the framework for continuous assessment of the program.

The response to our assessment report last year was positive and praised our assessment approach. We are grateful for the feedback from last year and we will continue to identify gaps in our assessment and think of new ways to assess our program.

The feedback received also agreed with reflection points made in this year's report, namely that use of rubrics for a more diverse assessment methodology would be helpful. It is our intention to develop a rubric for our next assessment of PLO#3 in AY 2024-2025 in one of our senior capstone courses.

ADDITIONAL MATERIALS

Assessment Instrument

PLOs 1 and 2 Neuroscience Minor Assessment: F2023

9-Item Assessment Measure

This questionnaire is part of the Neuroscience Minor assessment of our Program Learning Outcomes. Your responses will not affect your course grade in any way. Please answer the following multiple-choice questions to the best of your ability and without consultation of outside supporting sources.

As Neuroscience Minor Director, I truly appreciate your consideration of this request and your willingness to help with the assessment of Cognitive Psychology.

This questionnaire should take 5-10 minutes on average. Thank you!

_____

Please indicate your MAJOR program of study. If it is not PSYCHOLOGY, please mark "Other" and type your response in the box provided:

- ○ Psychology Major (1)
- ○ Other (2) _____

Please indicate which of the following best describes your MINOR program of study. If it is not NEUROSCIENCE, please mark "Other" and type your response in the box provided:

- ○ Neuroscience (1)
- ○ Other (2) _____

Q1. 75% of the cortex is made up of _____, and 25% is made up of _____

- ○ a. sensory areas; association areas (1)
- ○ b. motor and association areas; sensory areas (2)
- ○ c. association areas; sensory and motor areas (3)
- ○ d. association and sensory areas; motor areas (4)

Q2. Which area of the brain acts as a relay station for nearly all sensory information going to the cortex?

- ○ a. Hypothalamus (1)
- ○ b. Hippocampus (2)
- ○ c. Amygdala (3)
- ○ d. Thalamus (4)

Q3. The fact that edges are enhanced in our perception of Mach bands is a result of _____ due to the activity of _____

- a. Lateral inhibition; photoreceptors (1)
- b. Lateral inhibition; horizontal cells (2)
- c. Top-down modulation; edge detectors in the LGN (3)
- d. Top-down modulation; edge detectors in V1 (4)

Q4. In what order does the information received by the rods and cones get directed to the cortex?

- a. Ganglion cells, bipolar cells, optic nerve, to lateral geniculate nucleus (1)
- b. Optic nerve, ganglion cells, bipolar cells, to lateral geniculate nucleus (2)
- c. Optic nerve, lateral geniculate nucleus, bipolar cells, to ganglion cells (3)
- d. Bipolar cells, ganglion cells, optic nerve, to lateral geniculate nucleus (4)

Q5. What happened to H.M. as a result of his brain surgery?

- a. His epilepsy got worse (1)
- b. His epilepsy continued at the same level (2)
- c. He was unable to recall old memories (3)
- d. He was unable to store new memories (4)

Q6. What is a symptom of a lesion in the “what” system in the visual stream?

- a. Difficulty in reaching, but not so much in object identification (1)
- b. Difficulties in both reaching and object identification (2)
- c. Visual agnosia (3)
- d. Hemispatial neglect (4)

Q7. Which parts of the brain are most affected by Capgras Syndrome?

- a. thalamus and hypothalamus (1)
- b. amygdala and prefrontal cortex (2)
- c. cerebellum and amygdala (3)
- d. prefrontal cortex and hippocampus (4)

Q8. A split-brain patient is shown an image of a spoon on the left side of a screen and an image of a fork on the right side of that same screen. When asked to report verbally what was seen the patient will report:

- a. A spoon (1)
- b. A fork (2)
- c. Both a spoon and a fork (3)
- d. Nothing (4)

Q9. What is one of the major ways by which the brain binds information?

a. Parallel processing
b. Serial processing
c. Neural synchrony
d. Perceptual constancy