

## Neuroscience Department

### Introduction

The Neuroscience program existed as a joint endeavor shared between the Biology and Psychology Departments until the summer of 2014. At that point, it transitioned to a stand-alone department and the first Neuroscience Department Chair (Dr. Greg Butcher) was hired. Over the 2014-15 academic year Dr. Butcher and a working group of contributing faculty members (Drs. Swerdlow, Pickens, Griffin and Montgomery) developed a revised curriculum that better aligns the program with conventions in the field (Ramirez, 1995; Wierelak, 2003). As part of this process, the following assessment plan was developed. Portions of this plan were implemented in the 2014-15 academic year, but the majority of our student learning outcomes will begin assessment starting with the matriculating class of 2015.

### I. Purpose Statement

The Neuroscience Department provides students with an interest in the nervous system the opportunity to explore the discipline at levels of analysis ranging from molecules to societal interaction. Faculty members from multiple departments across the College contribute to the neuroscience curriculum. This interdisciplinary approach provides students with a solid foundational knowledge of neuroscience while retaining the flexibility to pursue electives emphasizing their specific interests and career aspirations.

### II. Neuroscience program student learning outcomes (SLO; this content is replicated in table form in Appendix 1)

Through completing of a neuroscience major at Thiel, students:

- 1) Develop an interdisciplinary knowledge base in neuroscience,
- 2) Refine communication skills, and
- 3) Actively contribute to their own professional development.

### III. Methods of Assessment

**SLO 1:** Neuroscience students develop an interdisciplinary knowledge base in neuroscience that spans levels of analysis from molecular interactions to societal issues. The neuroscience major provides all students with exposure to neuroscience techniques, modes of inquiry, and real world applications in the areas of:

- Molecular neuroscience,
- Cellular biology,
- Circuits and pathways,
- Functional systems and anatomy,
- Cognitive neuroscience, and
- Neuroscience in society.

#### 1a. Breadth of Knowledge

These subdivisions of the field are covered through a core of courses completed by all neuroscience majors (NSCI 101, 202, 250, 333, 400 and 444).

*Means of Assessment:* Starting with the matriculating class of 2015, all neuroscience majors complete a comprehensive exam during the first semester they declare a neuroscience major and the final semester of their senior year.

*Measure of Success:* Each cohort of majors achieves a learning gain of at least 25% between the two exams.

### **1b. Depth of knowledge**

Additionally, all neuroscience majors obtain depth of knowledge in at least one of these subdivisions through focused study beyond the core coursework. This occurs through the required internship (NSCI 409), independent research project (499), and elective coursework.

*Means of Assessment:* Starting in the spring of 2016, all neuroscience majors will present a formal lecture as part of NSCI 444 (Senior Seminar in Neuroscience) on a topic of their choice from one of the above mentioned areas. This presentation will be recorded and scored by a panel of faculty members who contribute to the Neuroscience major using an in-house rubric developed to assess neuroscience content.

*Measure of Success:* At least 75% of each cohort of seniors achieve a performance score of at least 75%.

**SLO 2:** Neuroscience majors refine their communication skills through preparation and presentation of oral, written, and social media material.

### **2a. Oral Communication**

*Means of Assessment:* All neuroscience majors will present oral reports in at least two Presentation Intensive Courses (PICs) within the major (NSCI 333, 444, and other PIC courses as approved). These presentations will be assessed using the AAUP Value Rubric for Oral Communication.

*Measures of Success:*

- Greater than 25% of all neuroscience majors annually complete at least one oral report in a PIC on a topic related to neuroscience.
- Prior to graduation, greater than 75% of students demonstrate a score of at least three.

### **2b. Written Communication**

*Means of assessment:* All neuroscience majors generate a formal review paper on a neuroscience-related topic in at least two Writing Intensive Courses (WICs) within the major. These papers are submitted by the student to their e-portfolio and assessed using the AAUP Written Communication rubric.

*Measures of Success:*

- At least 25% of all majors complete their review paper each year
- Greater than 75% of majors demonstrate proficiency with scores of at least three.
- Greater than 25% of students submit at least one report for publication prior to graduation.

### **2c. Social Media Literacy**

*Means of assessment:* All neuroscience majors generate a professional web-presence utilizing social media outlets such as LinkedIn or Research Gate. These profiles will be developed in NSCI 333.

*Measures of Success:* At least 25% of all majors complete social media profile on at least one platform annually.

**SLO 3:** Neuroscience majors will actively contribute to their own professional development through:

### **3a. Collaborative projects**

*Means of assessment:* All neuroscience majors participate in multiple collaborative projects that are assessed using the AACU Value Teamwork rubric. These projects are drawn from NSCI 202, 209, 400 and other elective courses.

*Measures of Success:* Greater than 75% of all majors demonstrate proficiency with scores of at least three prior to graduation.

### **3b. Critical thinking**

*Means of assessment:* A sample of relevant assignments from NSCI 202 and 400 will be scored using the AACU Value rubric on Critical Thinking.

*Measures of Success:* Greater than 75% of majors demonstrate proficiency with scores of at least three.

### **3c. Experimental design and data analysis**

*Means of Assessment:* All students will complete the Experimental Design Ability Test (EDAT) at three points in their academic careers; during their first, sophomore and senior year (NSCI 101, 202 and 400 respectively).

*Measures of Success:*

- Greater than 50% of majors will score a 4 or better on the EDAT (out of a possible 10) by their sophomore assessment.
- Greater than 75% of majors will score a 6 or better on the EDAT by the end of their senior year.

### **3d. Real-world applications**

*Means of assessment:* All neuroscience majors complete an internship and independent study project (NSCI 409 and 499).

*Measures of Success:*

- At least 25% of all majors complete an internship and research project each year
- At least two neuroscience students present their research at a local, regional or national scientific meeting.

## **References**

Wiertelak, E (2003) Neuroscience Education: Goals for the Undergraduate Program. Essay for Project Kaleidoscope. Neuroscience Network.

Ramirez, JJ (1995) Occasional Paper on Neuroscience from the PKAL workshop Interdisciplinary Connections: Undergraduate Neuroscience Education.

### Appendix I

Student Learning Outcome	Sub-topic	Relevant coursework	Course assessed	Means of assessment	Measure of success
1) Develop an interdisciplinary knowledge base in neuroscience	1a. Breadth of Knowledge	NSCI 101, 202, 250, 333, 400 and 444	NSCI 101 and 444	Comprehensive exam	Each cohort of majors achieves a learning gain of at least 25% between the two exams.
	1b. Depth of Knowledge	NSCI 409, 499 and electives.	NSCI 444	Lecture presentation	At least 75% of each cohort of seniors achieve a performance score of at least 75%.
2) Refine communication skills	2a. Oral Communication	NSCI 101, 202, 250, 333, 400 and 444	NSCI 333, 444 and other PIC courses	Oral presentation assessed with the AACU Oral Communication rubric	Greater than 25% of all neuroscience majors annually complete at least one oral report in a PIC on a topic related to neuroscience. Prior to graduation, greater than 75% of students demonstrate a score of at least three
	2b. Written Communication	NSCI 101, 202, 250, 333, 400 and 444	NSCI 409, and other WIC electives	Review paper assessed with the AACU Written Communication rubric	At least 25% of all majors complete their review paper each year. Greater than 75% of all majors demonstrate proficiency with scores of at least three. Greater than 25% of students submit at least one report for publication prior to graduation.
	2c. Social Media Literacy	NSCI 333	NSCI 333	Social media profile	At least 25% of all majors complete social media profile one platform annually.

3) Actively contribute to their own professional development	3a. Collaborative Projects	NSCI 202, 209, 400 and other elective courses	NSCI 202, 209, 400 and other elective courses	Collaborative project assessed with the AACU Teamwork Rubric	Greater than 75% of all majors demonstrate proficiency with scores of at least three prior to graduation.
	3b. Critical Thinking	NSCI 202 and 400	NSCI 202 and 400	Written assignments assessed with the AACU critical Thinking Rubric	Greater than 75% of all majors demonstrate proficiency with scores of at least three.
	3c. Experimental design and data analysis	NSCI 101, 202 and 400	NSCI 101, 202 and 400	Completion of the EDAT assessment tool.	Greater than 50% of majors will score a four or better on the EDAT by their sophomore year. Greater than 75% of majors will score a six or better by the end of their senior year.
	3d. Real-world applications	NSCI 409 and 499	NSCI 409 and 499	Completion of an internship and independent research project	At least 25% of all majors complete an internship and research project each year. At least two neuroscience students present their research at a local, regional, or national scientific meeting.