

Annual Assessment Report
Neuroscience Program
May 2018

Summary and Strengths

Program Growth

The interdisciplinary Neuroscience Program is completing its second year. The Neuroscience Program at Hendrix College is an exceptional undergraduate major since it incorporates required courses from the natural sciences, social sciences, and the humanities; most undergraduate Neuroscience Programs only include two areas of study. We emphasize the interdisciplinarity of neuroscience. Student interest in neuroscience is growing. The first year we had three graduates; this year there are five graduates; and we expect that next year there will be nine neuroscience majors graduating. The continued growth of the Neuroscience Program will require careful supervision by the participating faculty in the coming years.

Learning Goals and Comprehensive Assessment Plan

Having received faculty approval, the Neuroscience Faculty have spent the last two years developing the learning goals and assessment plan for the Neuroscience Program, thanks especially to the Assessment Subcommittee's diligent efforts. We have had several program meetings that have discussed the developing assessment plan. We have agreed upon six learning goals (see appendix 1). Just this spring we adopted an assessment plan (see appendix 2). Since this plan was approved in the middle of the semester, specific aspects of the plan could not be implemented this year. However, we are conducting a trial assessment this spring. Some data on assessment will be collected. Graduating seniors have completed the senior survey for these first two years. We are asking the Neuroscience Faculty to provide whatever data they have for their spring courses.

Capstone Course

As an interdisciplinary program, we have been mindful of the need to make the capstone course a place to bring together, discuss, and showcase the broad knowledge that our majors have gained. The first two years have set a solid groundwork for growth and development of this course. The description of the senior capstone course is: "An advanced seminar in neuroscience for senior neuroscience majors only. Topics are chosen by the neuroscience faculty, and students have the opportunity to integrate and synthesize what they have learned in their neuroscience major." The Syllabus for the 2018 Capstone course stated: "The neuroscience capstone course culminates the neuroscience major. It brings all the majors together in their final semester in order to share information, learn from each other, and synthesize their work in neuroscience. The course is directed by one member of the neuroscience faculty with the participation of the other faculty. Each year the emphasis of this course is determined by the leading faculty member. This year there are three foci or learning goals: 1. the development and understanding of the field of neuroethics, 2. the communication of neuroscience to the general public, and 3. the analysis of the problem of reductionism and the role of interdisciplinarity in the field of neuroscience."

The capstone has been designed to help our program meet four of our six learning goals (see appendix 1). The first and second learning goals (core knowledge and techniques) are accomplished in other required courses and so are not directly relevant to the capstone course. The fourth and sixth learning goals concern the general academic skills of critical reading and thinking as well as oral and written communication. The capstone course required reading different texts on neuroethics and reductionism, as well as their discussion in the seminars. Students were required to write two seven-page papers on these topics and they presented two twenty-minute power point discussions in these areas. Scientific communication skills were further developed in the students' power point presentations for a general public audience in the "Neuroscience for Everyone" event on Reading Day.

Two different aspects of the capstone addressed the third learning goal of interdisciplinarity. Throughout the semester, three neuroscience faculty presented guest lectures. They assigned and discussed different articles in neuroscience literature, with a focus on demonstrating the interdisciplinary nature of neuroscience. This aspect was also the central aim in the discussion of reductionism where one side of the debate, represented by readings from Craver and Krakauer, argues for the multi-level interdisciplinarity of neuroscience. The fifth learning goal concerning the ethical issues in neuroscience was the emphasis of the first set of readings in the capstone course (neuroethics). We specifically examined the justification of ethical judgments concerning cognitive enhancement from the perspectives of Aristotelean, Kantian, and Utilitarian ethical theories.

Action Plan for Improvement

We have already identified a few challenges in our proposed assessment plan and we will be visiting these in the coming year. These challenges are due to two primary factors, our interdisciplinarity and the relative newness of neuroscience as a field. The fact that we are a very interdisciplinary program means that the majority of our courses are not housed within an integrated department. Our core courses (see appendix 2) come from three departments, Biology, Philosophy, and Psychology. These courses will be taught by Neuroscience Faculty for the foreseeable future and so will be straightforward to assess. Other required courses and electives may or may not be taught by members of the Neuroscience Program. Consequently, we will only be assessing courses that are taught by our contributing members at this time. After we have a couple years of assessment data, we will revisit this to determine if this targeted sampling approach is providing us with meaningful information. The second factor that presents us with a challenge is the lack of a standardized test for neuroscience. Based on conversations with outside assessors familiar with undergraduate Neuroscience Programs, it is unlikely that such a test will be created. Our current assessment plan is our best first effort and we are cognizant that this may require significant adjustments in the future. We will base adjustments on feasibility of the current plan and the quality of the data collected. Future plans may include using established rubrics for each key concept identified in the core courses, rather than reporting of grades.

Appendix 1

NEUROSCIENCE PROGRAM LEARNING GOALS

The Neuroscience Program's stated learning goals for our students are to develop:

1. A broad understanding of the development, organization, and function of the nervous system and the foundational assumptions of philosophy of mind and philosophy of science;
2. knowledge of the techniques and methods of neuroscience research and how the scientific method is used to address questions relevant to neuroscience;
3. an appreciation of the interdisciplinary nature of neuroscience that requires an integration of knowledge from multiple disciplines and levels of analysis;
4. critical reading and thinking skills that allow students to assess and contextualize neuroscience literature;
5. an understanding of the ethical issues in the field of neuroscience and the approaches neuroscientists use to confront them; and
6. oral and written scientific communication skills.

Appendix 2

NEUROSCIENCE PROGRAM ASSESSMENT PLAN

The Neuroscience Program's stated learning goals for our students are to develop:

7. A broad understanding of the development, organization, and function of the nervous system and the foundational assumptions of philosophy of mind and philosophy of science;
8. knowledge of the techniques and methods of neuroscience research and how the scientific method is used to address questions relevant to neuroscience;
9. an appreciation of the interdisciplinary nature of neuroscience that requires an integration of knowledge from multiple disciplines and levels of analysis;
10. critical reading and thinking skills that allow students to assess and contextualize neuroscience literature;
11. an understanding of the ethical issues in the field of neuroscience and the approaches neuroscientists use to confront them; and
12. oral and written scientific communication skills.

LEARNING GOAL 1

A broad understanding of the development, organization, and function of the nervous system and the foundational assumptions of philosophy of mind and philosophy of science

No standardized test exists to assess knowledge of neuroscience (i.e., Major Field Test, GRE Subject test). A number of other Neuroscience departments/programs (ACS and beyond) were contacted and it appears that no one has developed a comprehensive means of assessment at this time. Consequently, our program will assess this learning goal by sampling from existing assessments that exist within our core courses. Future options may include developing course or major specific pre- and post- tests.

Students who successfully complete the following courses should achieve this learning goal:

- PSYC 220 Brain and Behavior
- PHIL 350 Philosophy of Mind
- PHIL 390 Philosophy of Science
- BIOL 325 Cellular and Molecular Neuroscience
- BIOL 425 Systems Neuroscience

Classroom teachers for each of these courses will identify the most important or foundational concepts that a Neuroscience major should retain. Faculty will then identify a pre-existing and course-specific means of assessing these concepts. Examples for assessing an individual concept

include, but are not limited to, a single question or grouping of questions, a paper or essay, or a quiz.

The program will keep annual records of the following:

1. The key concepts for each core course
2. The means of assessment for each concept
 - For example, the text of the question(s) or paper/essay prompt
3. The scoring rubric or key for each means of assessment
4. The mean student score for the means of assessment
 - For PSYC 220, this should include declared Neuroscience major *and* all students
 - For all other courses, this should include declared Neuroscience majors *only*

LEARNING GOAL 2

Knowledge of the techniques and methods of neuroscience research and how the scientific method is used to address questions relevant to neuroscience

The program will keep annual records of the following:

1. The number of declared majors presenting posters and papers at state, regional, and national meetings and the citations for each presentation
2. The number of declared majors who are authors on research publications, and the citations for each publication
3. The number of declared majors who write research or review papers in each course and the title of each paper
4. The subjective student perspective provided in the Neuroscience Senior Survey

Future assessment goals may include using a faculty-developed rubric to assess the use of the scientific method and specific techniques in select courses.

LEARNING GOAL 3

An appreciation of the interdisciplinary nature of neuroscience that requires an integration of knowledge from multiple disciplines and levels of analysis

The program will keep annual records of the following:

1. The number of distinct 4-letter codes achieved *within the major* by each graduating senior
 - for example: BIOL, PSYC, PHIL, CSCI, etc.
2. The subjective student perspective provided in the Neuroscience Senior Survey

Future assessment goals may include using a faculty-developed rubric to assess an interdisciplinary paper from the capstone course.

LEARNING GOAL 4

Critical reading and thinking skills that allow students to assess and contextualize neuroscience

The program will keep annual records of the following:

1. The number of declared majors presenting posters and papers at state, regional, and national meetings and the citations for each presentation
2. The number of declared majors who are authors on research publications, and the citations for each publication
3. The number of declared majors who write research or review papers in each course and the title of each paper
4. The Neuroscience Capstone grade
5. The subjective student perspective provided in the Neuroscience Senior Survey

LEARNING GOAL 5

An understanding of the ethical issues in the field of neuroscience and the approaches neuroscientists use to confront them

The program will keep annual records of the following:

1. Certificates of completion of either the human subjects or animal subjects training course offered by the NIH Office of Extramural and Intramural Research, respectively. These will be conducted as part of the capstone course.
 - Human subjects course: <https://phrp.nihtraining.com/index.php>
 - o Topics: codes and regulations, respect for persons, beneficence and justice
 - Animal subjects course: https://oacutrainig.od.nih.gov/public_menu.aspx
 - o Topics: animal care and use policies, occupational health and safety, animal health and well-being, animal care and use procedures
2. The subjective student perspective provided in the Neuroscience Senior Survey

Future assessment goals may include using a faculty-developed rubric to assess an ethics discussion, paper or presentation from the capstone or other core course.

LEARNING GOAL 6

Oral and written scientific communication skills

The program will keep annual records of the following:

1. The number of declared majors presenting posters and papers at state, regional, and national meetings and the citations for each presentation
2. The number of declared majors who are authors on research publications, and the citations for each publication
3. The number of declared majors who write research or review papers in each course and the title of each paper
4. The number of students who give oral presentations in each course and the titles of those presentations

SUMMARY OF DATA TO BE COLLECTED ON AN ANNUAL BASIS

All materials will be requested at the end of each semester by the chair of the assessment sub-committee. Records will be maintained electronically and sent to the program chair upon assimilation each year.

The program will keep annual records of the following:

1. Key concepts, means of assessment of each concept, scoring rubric or key and mean student scores from the following courses: (relevant course instructors)
 - PSYC 220 Brain and Behavior: all students and declared majors
 - PHIL 350 Philosophy of Mind: declared majors only
 - PHIL 390 Philosophy of Science: declared majors only
 - BIOL 325 Cellular and Molecular Neuroscience: declared majors only
 - BIOL 425 Systems Neuroscience: declared majors only
2. The number of declared majors presenting posters and papers at state, regional, and national meetings and the citations for each presentation (all program faculty, and students)
3. The number of declared majors who are authors on research publications, and the citations for each publication (all program faculty, and students)
4. The number of declared majors who write research or review papers in each course and the title of each paper (all program faculty)
5. The number of students who give oral presentations in each course and the titles of those presentations (all program faculty)
6. The Neuroscience Capstone grade (course instructor/program chair)
7. The number of distinct 4-letter codes achieved within the major by each graduating senior (program chair)

8. Certificates of completion of either the human subjects or animal subjects training course for each graduating senior (student assessment/part of capstone moving forward)
9. The subjective student perspective provided in the Neuroscience Senior Survey (assessment chair