Cognitive Neuroscience

Cognitive neuroscience is the study of higher cognitive functions in humans and their underlying neural bases. It is an integrative area of study drawing primarily from cognitive science, psychology, neuroscience, and linguistics. There are two broad directions that can be taken in this concentration - one is behavioral/experimental and the other is computational/modeling. In both, the goal is to understand the nature of cognition from a neural perspective. The standard concentration for the Sc.B. degree requires courses on the foundations, systems level, and integrative aspects of cognitive neuroscience as well as laboratory and elective courses that fit within a particular theme or category such as general cognition, perception, language development or computational/modeling. Concentrators must also complete a senior seminar course or an independent research course. Students may also participate in the work of the Brown Institute for Brain Science, an interdisciplinary program that unites ninety faculty from eleven departments.

Standard Program for the AB degree
(Effective Class of 2019)

The A.B. concentration requires 12 courses. The Sc.B concentration additionally requires 1 laboratory course and 4 approved science courses, totaling to a total of 17 required courses.

Common Core

The introductory course, “CLPS 0010 Mind, Brain, and Behavior,” surveys the broad territory of the scientific study of the mind, as uniquely represented by our department. The course maps the breadth of the science of the mind, focusing on fascinating questions, garnered insights, common commitments, and successful techniques and approaches. The course could be taken by students interested in the CLPS concentrations or as an introduction at the beginning of one’s college career or as an integration after having completed a number of specialized courses in a particular concentration.

Careers in Cognitive Neuroscience and related fields requires familiarity with statistics. Therefore, the Cognitive Neuroscience concentration requires a course in Quantitative Methods (CLPS 0900). CLPS 0900 is a prerequisite for most of the laboratory courses, so concentrators should plan to take this course by their fourth semester. The department does not grant concentration credit of AP Statistics, regardless of score. Students who feel that CLPS 0900 is too elementary can complete an approved alternative course (e.g., APMA 1650, CLPS 2906).

Foundation

To provide students with a solid foundation of knowledge in their area of concentration and to minimize redundancy, the Cognitive Neuroscience concentration requires four foundation courses in Neuroscience, Cognitive Neuroscience, Cognitive Neuropsychology, and Computational Methods.

Electives

Each concentrator will take four additional courses that allow the student to go into depth in some of the relevant topics. These electives must include at least two courses at the cognitive neuroscience systems level. The courses designed to count as electives will often have foundation courses as prerequisites and may include laboratory courses, content courses, or seminars.

Research Methods and Capstone

Another element in the Cognitive Neuroscience concentration is a research methods course that builds on the introductory statistics course (which will be a prerequisite) but exposes students to a variety of topics in research of the mind: to empirical methods (e.g., surveys, chronometry, eye tracking, brain imaging), to common designs (e.g., factorial experimental, correlational, longitudinal), to research ethics, and to best practices of literature review. Concentrators will additionally take either a seminar course or an independent research course to serve as their capstone experience.

Additional requirements for Sc.B.

In line with university expectations, the Sc.B. requirements include a greater number of courses and especially science courses. The definition of “science” is flexible. A good number of these courses will be outside of CLPS, but several CLPS courses might fit into a coherent package as well. In addition, the Sc.B. degree also requires a lab course to provide these students with in-depth exposure to research methods in a particular area of the science of the mind.

Honors Requirement

The Research Methods course will serve as a requirement for admission to the Honors program in Cognitive Science, Cognitive Neuroscience, and Psychology. Previously, any lab course served as this requirement. This practice not only demanded a large number of lab courses as part of the CLPS curriculum but also suffered from frequent mismatches between the type of research the student wished to pursue and the type of lab course available in the relevant semesters. A more general research methods course is likely to prepare students better and more broadly than any single lab course can.

FOR DETAILED UPDATES, PLEASE REFER TO THE COGNITIVE, LINGUISTIC, AND PSYCHOLOGICAL SCIENCES (CLPS) UNDERGRADUATE PAGE.

Requirements for the A.B. degree

STANDARD PROGRAM FOR THE A.B. DEGREE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLPS 0010</td>
<td>Mind, Brain and Behavior: An Interdisciplinary Approach</td>
<td>1</td>
</tr>
<tr>
<td>CLPS 0900</td>
<td>Statistical Methods</td>
<td>1</td>
</tr>
<tr>
<td>One approved course in Cognitive Neuroscience, such as:</td>
<td>1</td>
<td></td>
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<tr>
<td>CLPS 0400</td>
<td>Cognitive Neuroscience</td>
<td></td>
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<tr>
<td>CLPS 0450</td>
<td>Brain Damage and the Mind</td>
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<tr>
<td>One approved course in Neuroscience, such as:</td>
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<tr>
<td>NEUR 0010</td>
<td>The Brain: An Introduction to Neuroscience</td>
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<tr>
<td>One approved course in Cognitive Neuropsychology, such as:</td>
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<td></td>
</tr>
<tr>
<td>CLPS 0450</td>
<td>Brain Damage and the Mind</td>
<td></td>
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<tr>
<td>CLPS 1420</td>
<td>Cognitive Neuropsychology</td>
<td></td>
</tr>
<tr>
<td>One approved course in Computational Methods, such as:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CLPS 0950</td>
<td>Introduction to programming</td>
<td></td>
</tr>
<tr>
<td>CLPS 1291</td>
<td>Computational Methods for Mind, Brain and Behavior</td>
<td></td>
</tr>
<tr>
<td>CLPS 1492</td>
<td>Computational Cognitive Neuroscience</td>
<td></td>
</tr>
</tbody>
</table>

Four Approved Electives, such as:

- CLPS 1150 Memory and the Brain
- CLPS 1470 Mechanisms of Motivated Decision Making
- CLPS 1480B Cognitive Aging and Dementia
- CLPS 1480C Cognitive Control Functions of the Prefrontal Cortex
- CLPS 1492 Computational Cognitive Neuroscience
- CLPS 1570 Perceptual Learning
- CLPS 1620 Developmental Cognitive Neuroscience
- NEUR 1540 Neurobiology of Learning and Memory
- NEUR 1930A Cognitive Neuroscience: Motor Learning
- NEUR 1940D Higher Cortical Function

One Independent Study or Approved Seminar, such as:

- CLPS 1400 The Neural Bases of Cognition
- CLPS 1480B Cognitive Aging and Dementia
- CLPS 1480C Cognitive Control Functions of the Prefrontal Cortex
- CLPS 1900 Research Methods And Design

Total Credits: 12
# Requirements for the Sc.B. degree

**STANDARD PROGRAM FOR THE Sc.B. DEGREE**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CLPS 0010</td>
<td>Mind, Brain and Behavior: An Interdisciplinary Approach</td>
<td>1</td>
</tr>
<tr>
<td>CLPS 0900</td>
<td>Statistical Methods</td>
<td>1</td>
</tr>
</tbody>
</table>

One approved course in Cognitive Neuroscience, such as:

- CLPS 0400 Cognitive Neuroscience
- CLPS 0450 Brain Damage and the Mind

One approved course in Neuroscience:

- NEUR 0010 The Brain: An Introduction to Neuroscience

One approved course in Cognitive Neuropsychology, such as:

- CLPS 1420 Cognitive Neuropsychology

One approved course in Computational Methods, such as:

- CLPS 0950 Introduction to programming
- CLPS 1291 Computational Methods for Mind, Brain and Behavior
- CLPS 1492 Computational Cognitive Neuroscience

**Four Approved Electives, such as:**

- CLPS 1150 Memory and the Brain
- CLPS 1470 Mechanisms of Motivated Decision Making
- CLPS 1480B Cognitive Aging and Dementia
- CLPS 1480C Cognitive Control Functions of the Prefrontal Cortex
- CLPS 1492 Computational Cognitive Neuroscience
- CLPS 1570 Perceptual Learning
- CLPS 1620 Developmental Cognitive Neuroscience
- NEUR 1540 Neurobiology of Learning and Memory
- NEUR 1930A Cognitive Neuroscience: Motor Learning
- NEUR 1940D Higher Cortical Function

**One Independent Study or Approved Seminar, such as:**

- CLPS 1400 The Neural Bases of Cognition
- CLPS 1480B Cognitive Aging and Dementia
- CLPS 1480C Cognitive Control Functions of the Prefrontal Cortex
- CLPS 1900 Research Methods And Design

**One Approved Laboratory Course, such as:**

- CLPS 1492 Computational Cognitive Neuroscience
- CLPS 1490 Functional Magnetic Resonance Imaging: Theory and Practice
- CLPS 1510 Auditory Perception Laboratory
- CLPS 1890 Laboratory in Psycholinguistics

**Four Approved Science Courses, such as:**

- BIOL 0200 The Foundation of Living Systems
- BIOL 0800 Principles of Physiology
- CHEM 0350 Organic Chemistry
- CSCI 1430 Computer Vision
- CSCI1950F Introduction to Machine Learning
- ENGN 1220 Neuroengineering
- MATH 0110 Introductory Calculus, Part II
- NEUR 1020 Neural Systems
- NEUR 1040 Introduction to Neurogenetics
- PHYS 0030 Basic Physics A

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1 For a complete list of approved courses, see the CLPS Cognitive Neuroscience page.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Helvetica was used instead of Arial.

The editor may contact Leepfrog for a draft with the correct fonts in place.