

Psychological & Brain Sciences: Cognitive Neuroscience Major

Program Requirements

- **Total units required:** 45-49 units (36-37, as well as prerequisites, for the major requirements plus 9-12 units for the specialization)

How does the brain think? Cognitive neuroscience refers to how mental functions are linked to the operation of the brain and nervous system. The goal of cognitive neuroscience is to provide an understanding of psychological processes such as attention, memory, thinking, and emotion in terms of physical principles and biological components. At the same time, cognitive neuroscience aims to provide an understanding of the psychological constraints on how the brain functions, computes, and generates behavior. Students who pursue the undergraduate major in Psychological & Brain Sciences: Cognitive Neuroscience (PB&S:CN) will gain a strong foundation in how to study the brain and mind at various levels of analysis, including cellular biology, brain systems, cognitive and affective function, and neural computation. In addition, they will gain an appreciation of the relation between healthy cognitive and brain function and its breakdown in various disease states and disorders. The PB&S:CN major provides excellent preparation for a career in health and medical professions, scientific research, computer fields, education, and law.

Prerequisites

Students must complete the following courses outside of Psychological & Brain Sciences:

Code	Title	Units
Math 132	Calculus II	3
Biol 2960	Principles of Biology I	4
Total Units		7

Note: Each of these prerequisites has its own prerequisites: Math 132 Calculus II requires Math 131; for Biol 2960 Principles of Biology I, taking Chem 111A and Chem 112A (concurrently) is strongly recommended. These courses are biology and pre-med prerequisites as well, and they are typically completed during a student's first year. They may alternatively be satisfied through AP credit or any other mechanism approved by the respective department or the College. These prerequisites do not earn credit toward the P&BS:CN major, but must be completed with a passing grade (C- or above) by the end of the student's third-year to remain in good standing for the major.

Required Courses

Code	Title	Units
Psych 100B	Introduction to Psychology	3
Psych 300	Introduction to Psychological Statistics	3
Psych 301 or Psych 3011	Experimental Psychology	4
Psych 3401 or Psych 344	Biological Psychology Principles of the Nervous System	3
Psych 360	Cognitive Psychology	3
Psych 3604	Cognitive Neuroscience	3
Total Units		19

Note: The first three requirements (i.e., Psych 100B Introduction to Psychology, Psych 300 Introduction to Psychological Statistics, and Psych 301 Experimental Psychology/Psych 3011 Experimental Psychology) are the same as those for the regular P&BS major. Psych 344 Principles of the Nervous System is home-based in Biology; students should register under the cross-listed Psych L33 course designation, not Biol 3411 Principles of the Nervous System.

Exemption from Psych 100B Introduction to Psychology is possible in the following circumstances:

- Completion of an equivalent course transferred from another institution, if approved by the director of undergraduate studies.
- An AP psychology test score of 5, an IB score of 6 or 7, or a British A-Level grade of A.
- SDS 2200, SDS 3200, or DAT 120 may substitute for Psych 300 Introduction to Psychological Statistics. No AP math course can substitute for Psych 300 Introduction to Psychological Statistics.

In cases where an exemption is granted (e.g., Psych 100B, Psych 300), no credits are earned toward the major, so exempt courses must be made up with additional P&BS content electives (approved by the major advisor).

Additional Cognitive and Biological Distributions

Students must complete two courses — one each from the Distribution A and B lists:

*Distribution A eligible courses:**

Code	Title	Units
Psych 321	Developmental Psychology	3
Psych 330	Sensation and Perception	3
Psych 358	Language Acquisition	3
Psych 361	Psychology of Learning	3
Psych 380	Human Learning and Memory	3
Psych 4099	Human Evolutionary Psychology	3
Psych 4182	Perception, Thought, and Action	3

Psych 433	Psychology of Language	3
Psych 3175	Applied Statistical Analysis with R	3
Psych 3890	Advanced Psychological Statistics: The General Linear Model and Beyond	3

Distribution B eligible courses:*

Code	Title	Units
Psych 345	Genes, Environment, and Human Behavior	3
Biol 3057	Physiological Control Systems	3
Biol 3151	Endocrinology	3
Biol 328	Principles in Human Physiology	4
Biol 3421	Introduction to Neuroethology	3
Biol 3422	Genes, Brains, and Behavior	3
Biol 363	The Neuroscience of Movement: You Think, So You Can Dance?	3
Physics 350	Physics of the Brain	3
Psych 3175	Applied Statistical Analysis with R	3
Psych 3890	Advanced Psychological Statistics: The General Linear Model and Beyond	3

Note: Psych 3175 Applied Statistical Analysis with R or Psych 3890 Advanced Psychological Statistics: The General Linear Model and Beyond can be allowed to fulfill either Distribution A or B; students must complete at least one non-statistics course for the Additional Cognitive and Biological Distributions requirement.

Computation Requirement

Students must complete one of the following courses:*

Code	Title	Units
CSE 131	Introduction to Computer Science	3
Psych 3175	Applied Statistical Analysis with R	3
Psych 4631	Introduction to Computational Cognitive Science	3
Psych 5007	Statistics and Data Analysis in MATLAB	2

With prior approval, another course involving a significant computational/programming component may be substituted.

Capstone/Depth Requirement

Students must complete three of the following courses:*

Capstone/Depth eligible courses:

Code	Title	Units
Psych 4182	Perception, Thought, and Action	3
Psych 4412	Advanced Cognitive Neuroscience (or Psych 4413 Advanced Cognitive Neuroscience (WI))	3
Psych 4512	Neurobiology of Learning & Memory	3
Psych 4631	Introduction to Computational Cognitive Science	3

Psych 4746	Biological Pathways to Psychopathology: From Genes and the Environment to Brain and Behavior	3
Psych 4765	Inside the Disordered Brain: Biological Bases of the Major Mental Disorders	3
Biol 404	Laboratory of Neurophysiology	4
Biol 4030	Biological Clocks	3
Biol 4580	Principles of Human Anatomy and Development	3
Biol 4582	The Physiology and Biophysics of Consciousness	2
Phil 4212	Philosophy of Neuroscience	3

Additional Capstone/Depth eligible courses:

- Psych 333 (all 3 units must be completed in one semester and in one lab to be considered for approval; taken Credit/No-Credit) can be used satisfy up to 3 units of the Capstone/Depth requirement.
- FYP 3001 Ampersand: Research in Mind, Brain, Behavior (two consecutive semesters must be completed; 3 units total) can substitute for Psych 333.
- Psych 444B (3 units; taken for a letter grade and requiring a final paper) can be used to satisfy up to 6 units of the Capstone/Depth requirement.
- The Honors Program in Psychology (Psych 498/Psych 499 can be used to satisfy up to 3 units total of the Capstone/Depth requirement).

In total, no more than 6 units of the above may be applied toward the Capstone/Depth requirement.

Note: Unless a student explicitly petitions for an exception and is granted written prior approval, only the above Capstone/Depth eligible courses can be counted toward the Capstone/Depth requirement. Contact skohlman@wustl.edu for the petition.

- * If a course falls into more than one category, it can be used to fulfill only one of those categories (i.e., no double-counting).

Acceptance Into the Psychological & Brain Sciences: Cognitive Neuroscience Major

Acceptance into the major is contingent upon an application and then approval by the major committee. As part of this application, the student will meet with an appropriate advisor who will carefully review the requirements and oversee the student's progress. A brief, one-page statement from the student about why they feel the cognitive neuroscience major is appropriate for them will be requested as part of the application.

Washington University students will be considered for admission to the P&BS:CN major no sooner than during their third semester (sophomore year). Decisions are based on the student's statement and academic record as well as the interview with the advisor. A minimum GPA of 2.0 is required for admission into the major.



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