Psychological & Brain Sciences: Cognitive Neuroscience Major, Experimental Psychopathology Specialization

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	Experimental Psychology	4
or Psych 3011	Experimental Psychology	
Psych 3401	Biological Psychology	3
or Psych 344	Principles of the Nervous System	
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.

Experimental Psychopathology Specialization

To augment the major in Psychological & Brain Sciences, the department offers the option of a specialization for students who wish to engage more intensively with a specific area within the discipline.

A specialization may be a valuable experience for students planning on graduate study in psychology or related fields or for those who have a particular interest or want to gain expertise in one of the approved specializations. It may provide a useful preparation for the Honors program in psychology, or it may serve as a substitute for the Honors experience for those students who may not qualify for Honors.

Completion of a specialization entails 12 units:

- Three courses (9 units), at least one of which must be an advanced, 400-level course; and
- A semester of research in an appropriate, approved lab consisting of Psych 444C Independent Study for a Concentration in Psychological and Brain Sciences, which requires the successful completion of an American Psychological Association–style research paper or an approved Honors project. In some cases, a relevant internship or practicum may be an appropriate alternative to research experience. (**Note:** Students may be required to complete a preliminary semester [3 units] of Psych 333 Independent Study in Psychological and Brain Sciences, depending on the nature of the project intended for Psych 444C; the additional independent research is at the discretion of the research mentor and will not be counted toward the completion of the specialization requirements.)

One course taken for a specialization may be used to fulfill no more than one of the core categories or distribution requirements of a Psychological & Brain Sciences major (i.e., one course could double-count for the major and the specialization). None of the units for a specialization can be counted for any other major or minor (i.e., there is no double counting with another major or minor). For those pursuing the Psychological & Brain Sciences: Cognitive Neuroscience major, the Cognitive Neuroscience Specialization is not an option.

Each specialization has a Psychological & Brain Sciences faculty advisor/coordinator who will meet with interested students to help ensure the successful and appropriate completion of the specialization and who serves as the liaison with the Psychological & Brain Sciences Undergraduate Studies Committee. A student may pursue only one specialization.

Students should contact Shelley Kohlman (skohlman@wustl.edu) in Somers Family Hall, Room 207B, to arrange a specialization. Forms are available from Shelley, and completed forms must be returned to her in order for a specialization to be considered officially "in progress."

Recognition of the specialization will appear on the student's academic record under *Milestones* once all requirements have been met.

Requirements for the Experimental Psychopathology Specialization

This specialization allows students to acquire more advanced knowledge of the ways in which psychologists study mental disorders. Current research demonstrates the importance of integrating psychological and biological variables to better understand the classification, etiology, and treatment of a wide variety of mental disorders, including schizophrenia, mood disorders, anxiety disorders, substance use disorders, and eating disorders. Students who pursue this specialization will develop a broad-based appreciation for conceptual and methodological issues that are central to research in psychopathology.

Advisor/coordinator: Professor Deanna Barch

Course work required:

Code	Title	Units
Psych 354	Psychopathology and Mental Health	3

Electives (must include two courses, at least one of which is at the 400 level):

Code	Title	Units
Psych 345	Genes, Environment, and Human Behavior	3
Psych 4557	Biopsychosocial Aspects of Eating Disorders and Obesity	3
Psych 4746	Biological Pathways to Psychopathology: From Genes and the Environment to Brain and Behavior (Biological Pathways to Psychopathology)	3
Psych 4765	Inside the Disordered Brain: Biological Bases of the Major Mental Disorders (Inside the Disordered Brain)	3

Research mentorship: Prior approved research mentorship with a relevant faculty member and successful completion of a research paper (i.e., Psych 444C Independent Study for a Concentration in Psychological and Brain Sciences or Psych 498 Study for Honors/Psych 499 Study for Honors)

Relevant faculty: Deanna Barch, Ryan Bogdan, Josh Jackson, Renee Thompson, and Denise Wilfley (other potential faculty mentors may be approved)

Additional Information

Transfer Credit

If accepted by the College of Arts & Sciences, transfer credits will be evaluated by the director of undergraduate studies in the P&BS department for their applicability toward either major in P&BS.

Senior Honors Program in Psychological & Brain Sciences

The primary goal of the honors program in P&BS is to provide students who have achieved a superior academic record with the opportunity to conduct a comprehensive empirical investigation under the direction of a faculty member.

To be admitted into the honors program, students must meet the following requirements:

- Have overall and P&BS grade point averages of at least 3.65
- Complete both Psych 300 and Psych 301 (or Psych 3011)
- Have an approved honors research advisor

Contact:	Shelley Kohlman
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Email:	skohlman@wustl.edu
Website:	https://psych.wustl.edu/undergraduate-program