COGNITIVE SCIENCE, BACHELOR OF ARTS

https://cogsci.jhu.edu/undergraduate/

Cognitive science is the study of the human mind and brain, focusing on how the mind represents and manipulates knowledge and how mental representations and processes are realized in the brain. Conceiving of the mind as an abstract computing device instantiated in the brain, cognitive scientists seek to understand the mental computations underlying cognitive functioning, and how these computations are implemented by neural tissue. Also of central interest in cognitive science are questions about how cognitive functions develop, and how they break down when the brain is damaged.

Cognitive science is a relatively new field, having emerged at the interface of cognitive psychology, linguistics, neuroscience, philosophy, and computer science. As a consequence of this diverse ancestry, cognitive science incorporates a variety of perspectives and methodologies, including linguistic analysis, empirical studies of normal cognitive functioning in adults, developmental studies of children, cognitive neuropsychological research on cognitive deficits, functional neuroimaging studies, and computational modeling.

Our cognitive science undergraduate program reflects the interdisciplinary nature of the field, allowing students to approach the study of the mind and brain from multiple perspectives. Students gain broad knowledge of the field as a whole, plus a greater depth of the understanding in two of the sub-disciplines within the field. Training emphasizes not only learning about the principal theories and evidence, but also development of the conceptual and practical skills needed for understanding and conducting theoretical and empirical work in the field. Undergraduate students in the department also have many opportunities to get involved in research.

Cognitive Science Major Requirements

(Also see Requirements for a Bachelor's Degree. (https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/))

The required courses for cognitive science majors are divided into five general areas, as described below. The program is structured so as to ensure some exposure to each of the five areas. In addition, it provides in-depth training in two of the areas, deemed *focal areas*, chosen by the student. Majors in cognitive science thus acquire a broad perspective which will enable them to situate particular research disciplines within the overall study of the mind/brain.

Focal Areas: Students must take courses in all five focal areas; however, two focal areas must be chosen in which a greater selection of courses is required. The three focal areas not chosen may be referred to as 'non focal' areas for advising purposes. Courses offered by our department and other affiliated departments (e.g., Departments of Psychological and Brain Sciences, Philosophy, Computer Science, Neuroscience, etc.) may be used to satisfy the requirements for these areas. Examples of courses that satisfy the requirements for each area can be found on our website. (http://cogsci.jhu.edu/undergraduate/cognitive-science-major/) However, please note that courses change over time, and some courses are not offered every year. The Director of Undergraduate Studies (http://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/) can answer questions about which courses qualify for each focal area.

- **Cognitive Psychology/Neuropsychology** (COGS-COGPSY)
- **Linguistics** (COGS-LING)
- **Computational Approaches to Cognition** (COGS-COMPCG)
- **Neuroscience** (COGS-NEURO)
- **Philosophy of Mind** (COGS-PHLMND)

Course Requirements

- Departmental requirements may not be taken Satisfactory/Unsatisfactory, with the exception of research and practica.
- A grade of C- or better must be earned in all major requirements.

Code	Title	Credits
Two Focal Areas		
Four courses in each of the two chosen focal areas. Research, readings, and practica courses do not qualify. At least two courses in each focal area must be at the 300-600 level. [1]		12-16
Three 'Non-Focal' Areas		
One course at any level from each of the three non-focal areas. Research, readings, and practica courses do not qualify.		9-12
Additional Upper-Level Elective Courses		
Nine credits at the 300-600 level chosen from any of the five areas or other cognitive science courses. Up to three credits of cognitive science research, readings, or practica may apply. [2]		9
Math		
Select Math Option A or B:		6-8
Math Option A [3]		
Select two of the following:		
AS.110.106	Calculus I (Biology and Social Sciences)	
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
or AS.110.111	Honors Single Variable Calculus	
AS.110.201/212	Linear Algebra	
or EN.553.291	Linear Algebra and Differential Equations	
AS.150.118	Introduction to Formal Logic	
AS.150.420	Mathematical Logic I	
AS.050.370	Mathematical Models of Language	
AS.050.371	Bayesian Inference	
AS.050.372	Foundations of Neural Network Theory	
EN.553.171	Discrete Mathematics	
Math Option B: Statistics Sequence [4]		
AS.200.200 & AS.200.201	Research Methods in Psychology and Design & Statistical Analysis for Psychology	
Total Credits		**36-45**

1. Courses applying to each focus area are identified by their POS-Tags. See note for students completing the Linguistics focus area below.
2. Research, readings, or practica courses (AS.050.5xx) may be taken graded S/U and apply towards this requirement.
3. For students with **Cognitive Psychology/Neuropsychology as one of their focal areas**, Math Option B is required and should be completed, if possible, by the end of the sophomore year.

[4] Students who would like to substitute a different statistics course for one of the two Math Option B courses should consult with their Cognitive Science faculty advisor, then seek approval from the Director of Undergraduate Studies.

*Note for students pursuing the **Linguistics** focus area:* One intermediate or advanced foreign language course may be used to partially satisfy the upper-level course requirement for the Linguistics focus area and one other intermediate or advanced foreign language course may be used to partially satisfy the Additional Upper-Level Elective Courses requirement. Language course that currently apply begin with the department numbers: 210, 370, 373, 375, 377, 378, 380, 381, and 384. If seeking this focus area in the major, students are not eligible to complete the Linguistics minor.

Sample Program

The below sample program demonstrates how a student with the focal areas of **Cognitive Psychology/Neuropsychology** and **Linguistics** might complete the Cognitive Science major requirements in four years. In this scenario, the student has not placed out of any foreign language requirements. Each student's path through the program will have variation depending on the two focal areas they choose to pursue within the major.

First Year

First Semester	Credits	Second Semester	Credits
Course in Linguistics area (any level)	3-4	Course in Neuroscience area (any level)	3
	3-4		**3**

Second Year

First Semester	Credits	Second Semester	Credits
Course in Computational Approaches to Cognitive Science area (any level)	3-4	Course in Cognitive (Neuro)Psychology area (any level)	3
Course in Cognitive (Neuro)Psychology area (any level)	3	Course in Linguistics area (300-level or above)	3-4
AS.200.200	4	AS.200.201	4
	10-11		**10-11**

Third Year

First Semester	Credits	Second Semester	Credits
Course in Philosophy of Mind area (any level)	3	Cognitive Science elective (300-level or above)*	1-4
Course in Linguistics area (any level)	3-4	Course in Cognitive (Neuro)Psychology area (300-level or above)	3-4
	6-7		**4-8**

Fourth Year

First Semester	Credits	Second Semester	Credits
Course in Linguistics area (300-level or above)	3-4	Cognitive Science elective (300-level or above)*	1-4
Cognitive Science elective (300-level or above)*	1-4	Course in Cognitive (Neuro)Psychology area (300-level or above)	3-4
	4-8		**4-8**

Total Credits 44-60

* Up to 3 credits of cognitive science research, readings, or practica (AS.050.5xx courses) may apply toward the major requirements.

Honors and Awards

Departmental Honors

To receive Honors in Cognitive Science, graduating seniors must have a major GPA of 3.5 or higher. Graduating students will receive a major GPA calculation worksheet from the department in their final semester. The worksheet must be completed and submitted to the department's Director of Undergraduate Studies (http://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/) in a timely manner for review and approval. Only courses directly applied to a student's cognitive science major, including math and any language courses, factor into the major GPA calculation. All other elective courses should be excluded from the major GPA calculation. If the GPA requirement is met, departmental honors will appear on the student's transcript and will be indicated in that year's Commencement program.

Glushko Outstanding Undergraduate Cognitive Scientist Prize

This prize is awarded annually to the senior cognitive science major who has demonstrated the strongest combination of:

- academic excellence
- sustained and outstanding involvement in research (typically involving two or more semesters devoted to a single project)
- significant contribution of the undergraduate environment of the JHU Cognitive Science Department (e.g., service to Omega Psi), including contributing to diversity and inclusiveness of the program in any respect
- involvement in increasing awareness of cognitive science at JHU and beyond
- intent to pursue a career building on their expertise in cognitive science

The recipient receives a monetary prize of $500, is acknowledged in the Commencement program, and is invited to present research in which they have participated in the Department's Brown Bag Talk series.

Expected Learning Outcomes

Undergraduate cognitive science majors are expected to achieve the following learning outcomes:

- Acquire a firm grasp of the basic conception of the mind and brain that defines the discipline of cognitive science.
- Develop the fundamental skills required for understanding theories, evidence, and methods in cognitive science, and for pursuing advanced training in cognitive science or one of its sub-disciplines.
- Develop a basic understanding of the major sub-disciplines of cognitive science (i.e., linguistics, cognitive psychology and neuropsychology, neuroscience, computational approaches, philosophy of mind), and the relationships among sub-disciplines.
- Develop an understanding of theories, evidence, and research methods in the principal content domains within cognitive science (e.g., language, vision).
- Gain a deeper understanding of two sub-disciplines of cognitive science, and the principal content domains within these sub-disciplines.

- Acquire the skills required for clear and cogent written and oral communication in cognitive science.