

# COGNITIVE SCIENCE, BACHELOR OF SCIENCE

College of Letters & Science

## The Major Programs

The Cognitive Science major is designed to provide a broad interdisciplinary approach to the study of mind that includes courses from different departments and attracts students with a variety of interests. It emphasizes a multifaceted approach to the study of mind that integrates concepts and techniques from psychology, artificial intelligence, linguistics, neurology, philosophy and other relevant fields.

For students interested in the liberal arts the Cognitive Science major can be pursued as a Bachelor of Arts (A.B.) program. Alternatively, it can be pursued as a Bachelor of Science (B.S.) program for students with a stronger interest in the mathematical, neurological and computational foundations of the discipline. The main objective of both programs is to give the student a broad grounding in the integrated sciences of the mind and to connect approaches from different fields. Students must complete a number of core courses for the degree, as well as a number of specialty courses on such wide-ranging topics as logic for artificial intelligence, computational linguistics, cognitive neuroscience, animal cognition and the psychology of music.

## Career Pathways

A degree in Cognitive Science provides broad intellectual foundations useful for careers in a variety of areas, including teaching, business, social work/counseling and the information technology industry. Undergraduate education in cognitive science also prepares the student for graduate study in appropriate subfields of psychology, linguistics, philosophy and informatics. It is also suitable training for pre-medicine, pre-law, and pre-management students.

Bachelor of Science (B.S.) program students select to pursue either the Computational Emphasis (Emphasis 1) or the Neuroscience Emphasis (Emphasis 2).

## Major Advisor

Staff advisors are located in the Blue Ridge Office Building. For information about how to contact a major advisor, see Major Advising (<https://yellowcluster.ucdavis.edu/advising/undergraduate/major-advising/>).

The major requirements below are in addition to meeting University Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/>) & College Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/>); unless otherwise noted. The minimum total units required for both the Computational and Neuroscience emphases are 107.

## Computational Emphasis

Code	Title	Units
<b>Preparatory Subject Matter</b>		
<i>Cognitive Science:</i>		
CGS 001/PHI 010	Introduction to Cognitive Science	4
<i>Introduction to Mathematical Abstraction</i>		

ECS 020	Discrete Mathematics For Computer Science	4
<i>Programming</i>		
Choose a series:		12
ECS 032A or ECS 032AV	Introduction to Programming Introduction to Programming	
<b>AND</b>		
ECS 032B	Introduction to Data Structures	
<b>AND</b>		
ECS 034	Software Development in UNIX & C++ (prerequisite is ECS 032C)	
<b>OR</b>		
ECS 036A & ECS 036B & ECS 036C	Programming & Problem Solving and Software Development & Object-Oriented Programming in C++ and Data Structures, Algorithms, & Programming	
<i>Linguistics</i>		
LIN 001 or LIN 001Y	Introduction to Linguistics Introduction to Linguistics	4
<i>Calculus</i>		
Choose a series:		12
MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine	
<b>OR</b>		
MAT 019A & MAT 019B & MAT 019C	Calculus for Data-Driven Applications and Calculus for Data-Driven Applications and Calculus for Data-Driven Applications	
<b>OR</b>		
MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus	
<i>Linear Algebra &amp; MATLAB</i>		
MAT 022A & 022AL	Linear Algebra and Linear Algebra Computer Laboratory	4
<b>OR</b>		
MAT/BIS 027A	Linear Algebra with Applications to Biology	
<i>Philosophy</i>		
PHI 012	Introduction to Symbolic Logic	4
PHI 013G	Minds, Brains, & Computers with Discussion	4
<i>Psychology</i>		
PSC 001 or PSC 001V or PSC 001Y	General Psychology General Psychology General Psychology	4
<i>Research Methods</i>		
PSC 041 or PSC 041V	Research Methods in Psychology Research Methods in Psychology	4
<i>Statistics</i>		
STA 013 or STA 013Y or STA 100	Elementary Statistics Elementary Statistics Applied Statistics for Biological Sciences	4
Preparatory Subject Matter Subtotal		60

**Depth Subject Matter<sup>2</sup>**

*Important: Each class may only be used to satisfy one Cognitive Science major requirement. The same course cannot be used for multiple groups.*

Take each of the courses below: 8

PSC 100 Introduction to Cognitive Psychology

or PSC 100Y Introduction to Cognitive Psychology

PHI 112 Intermediate Symbolic Logic

Group A: Cognitive Science Topical Courses 4

CGS Topical Course: choose one upper division course from this list. (<https://ucdavis.box.com/s/qvabknkdo6tuazt836bq3uyctznzjjc/>)<sup>1</sup>

Group B: Computation

Choose three from Group B: 12

ECS 120 Theory of Computation

ECS 170 Introduction to Artificial Intelligence

ECS 171 Machine Learning

LIN 177 Computational Linguistics

PHI 133 Logic, Probability, & Artificial Intelligence

Group C: Neuroscience

Choose one from Group C: 4

CGS 107/  
PSC 133/ECN 107 Neuroeconomics/Reinforcement Learning & Decision Making

LIN 175 Biological Basis of Language

PSC 101 Introduction to Biological Psychology<sup>2</sup>

PSC 135 Cognitive Neuroscience: The Biological Foundations of the Mind<sup>2</sup>

PSC 139 Advanced Cognitive Neuroscience

PSC 145 Developmental Cognitive Neuroscience

Choose one from Group D or E: 4

Group D: Philosophy

PHI 103 Philosophy on Mind

PHI 104 The Evolution of Mind

PHI 129 Knowledge & the A Priori

PHI 136 Formal Epistemology

Group E: Linguistics

LIN 103A Linguistic Analysis I: Phonetics, Phonology, Morphology

LIN 103B Linguistic Analysis II: Morphology, Syntax, Semantics

LIN 150 Languages of the World

LIN 182 Multilingualism

Group F: Psychology

Choose four from Group F: 15-18

PSC 101 Introduction to Biological Psychology<sup>2</sup>

PSC 103A Statistical Analysis of Psychological Data

PSC 103B Statistical Analysis of Psychological Data

PSC 113 Developmental Psychobiology

PSC 121 Physiological Psychology

PSC/NPB 124 Comparative Neuroanatomy

PSC 130 Human Learning & Memory

PSC 131 Perception

PSC 135 Cognitive Neuroscience: The Biological Foundations of the Mind<sup>2</sup>

PSC 136 Psychology of Music

PSC 137 Neurobiology of Learning & Memory

PSC 140 Developmental Psychology

or PSC 140V Developmental Psychology

or PSC 140Y Developmental Psychology

PSC 141 Cognitive Development

Depth Subject Matter Subtotal 47-50

**Total Units 107-110**

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For a list of approved *CGS Topical Courses*, please see the major worksheet (<https://ucdavis.app.box.com/file/458212968122/?s=iu3cby5n5aimx4xvh5vkn26scb1bcqq4>).

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*Important: Each class may only be used to satisfy one Cognitive Science major requirement. The same course cannot be used for multiple groups.*

**Neuroscience Emphasis**

Code	Title	Units
<b>Preparatory Subject Matter</b>		
<i>Cognitive Science</i>		
CGS 001/PHI 010	Introduction to Cognitive Science	4
<i>Biological Science</i>		
BIS 002B	Introduction to Biology: Principles of Ecology & Evolution	5
BIS 002C	Introduction to Biology: Biodiversity & the Tree of Life	5
BIS 002A	Introduction to Biology: Essentials of Life on Earth (recommended to take after BIS 002B and BIS 002C)	5
<i>Linguistics</i>		
LIN 001 or LIN 001Y	Introduction to Linguistics	4
<i>Mathematics</i>		
Choose a series:		12
MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine	
<b>OR</b>		
MAT 019A & MAT 019B & MAT 019C	Calculus for Data-Driven Applications and Calculus for Data-Driven Applications and Calculus for Data-Driven Applications	
<b>OR</b>		
MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus	
<i>Philosophy</i>		
PHI 013G	Minds, Brains, & Computers with Discussion	4
<i>Physics</i>		
Choose a series:		12-15
PHY 007A & PHY 007B & PHY 007C	General Physics and General Physics and General Physics	
<b>OR</b>		

PHY 009A & PHY 009B & PHY 009C	Classical Physics and Classical Physics and Classical Physics	
<b>Psychology</b>		
PSC 001 or PSC 001V or PSC 001Y	General Psychology General Psychology General Psychology	4
<b>Research Methods</b>		
PSC 041 or PSC 041V	Research Methods in Psychology Research Methods in Psychology	4
<b>Statistics</b>		
STA 013 or STA 013Y or STA 100	Elementary Statistics Elementary Statistics Applied Statistics for Biological Sciences	4
Preparatory Subject Matter Subtotal		63-66
<b>Depth Subject Matter <sup>2</sup></b>		
<i>Important: Each class may only be used to satisfy one Cognitive Science major requirement. The same course cannot be used for multiple groups.</i>		
Take each of these courses below:		9
NPB 100	Neurobiology	
PSC 103A	Statistical Analysis of Psychological Data	
<b>Group A: Cognitive Science Topical Courses</b>		4
CGS Topical Course: choose one upper division course from this list. ( <a href="https://ucdavis.box.com/s/qvabknkdo6tuazt836bq3uycctznzjjc/">https://ucdavis.box.com/s/qvabknkdo6tuazt836bq3uycctznzjjc/</a> ) <sup>1</sup>		
<b>Group B: Computation</b>		
Choose one from Group B:		4-5
LIN 177	Computational Linguistics	
NPB 167	Computational Neuroscience (offered very irregularly)	
<b>Group C: Neuroscience</b>		
Choose 12-13 units from Group C:		12-13
CGS 107/ PSC 133/ECN 107	Neuroeconomics/Reinforcement Learning & Decision Making	
LIN 175	Biological Basis of Language	
NPB 161	Developmental Neurobiology (3 units)	
NPB 162	Neural Mechanisms of Behavior (3 units)	
NPB 163	Systems Neuroscience	
NPB 164	Mammalian Vision	
NPB 165	Neurobiology of Speech Perception (3 units)	
PSC 101	Introduction to Biological Psychology <sup>2</sup>	
PSC 121	Physiological Psychology <sup>2</sup>	
PSC 123/NPB 152	Hormones & Behavior (3 units)	
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind <sup>2</sup>	
PSC 139	Advanced Cognitive Neuroscience	
PSC 145	Developmental Cognitive Neuroscience	
Choose two from Groups D or E:		8
<b>Group D: Philosophy</b>		
PHI 103	Philosophy on Mind	
PHI 104	The Evolution of Mind	
PHI 129	Knowledge & the A Priori	

PHI 136	Formal Epistemology	
<b>Group E: Linguistics</b>		
LIN 103A	Linguistic Analysis I: Phonetics, Phonology, Morphology	
LIN 103B	Linguistic Analysis II: Morphology, Syntax, Semantics	
LIN 150	Languages of the World	
LIN 182	Multilingualism	
<b>Group F: Psychology</b>		
Choose two from Group F:		7
PSC 100 or PSC 100Y	Introduction to Cognitive Psychology Introduction to Cognitive Psychology	
PSC 101	Introduction to Biological Psychology <sup>2</sup>	
PSC 113	Developmental Psychobiology	
PSC 121	Physiological Psychology <sup>2</sup>	
PSC/NPB 124	Comparative Neuroanatomy	
PSC 130	Human Learning & Memory	
PSC 131	Perception	
PSC 132	Language & Cognition	
PSC 135	Cognitive Neuroscience: The Biological Foundations of the Mind <sup>2</sup>	
PSC 136	Psychology of Music	
PSC 137	Neurobiology of Learning & Memory	
PSC 140 or PSC 140V or PSC 140Y	Developmental Psychology Developmental Psychology Developmental Psychology	
PSC 141	Cognitive Development	
Depth Subject Matter Subtotal		44-46
<b>Total Units</b>		<b>107-112</b>

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For a list of approved *CGS Topical Courses*, please see the major worksheet (<https://ucdavis.app.box.com/file/458205152398/?s=7ielx1z8rp4i3qq5ajzxe5hzbmw2wyz3>).

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**Important:** Each class may only be used to satisfy one Cognitive Science major requirement. The same course cannot be used for multiple groups.