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 Alternatives

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 premanagement students.

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

Major Advisors

Staff advisors are located in Young Hall; cogsciadvising@ucdavis.edu; 530 752 5104. For more information on how to make an appointment or join Drop-In Advising, see Yellow Cluster Undergraduate Advising Center (https://yellowcluster.ucdavis.edu/advising/undergraduate/).

Computational Emphasis

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparatory Subject Matter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CGS 001/PHI 010</td>
<td>Introduction to Cognitive Science</td>
<td>4</td>
</tr>
<tr>
<td><strong>Computer Science Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECS 020</td>
<td>Discrete Mathematics For Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>Choose a series:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECS 032A &amp; ECS 032B &amp; ECS 034</td>
<td>Introduction to Programming and Introduction to Data Structures and Software Development in UNIX &amp; C++ (pre-req is ECS 032C)</td>
<td>12</td>
</tr>
</tbody>
</table>

Linguistics

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIN 001</td>
<td>4</td>
</tr>
<tr>
<td>or LIN 001Y</td>
<td></td>
</tr>
</tbody>
</table>

Mathematics

Choose a series: 12

<table>
<thead>
<tr>
<th>MAT 017A &amp; MAT 017B &amp; MAT 017C</th>
<th>Calculus for Biology &amp; Medicine and Calculus for Biology &amp; Medicine and Calculus for Biology &amp; Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 021A &amp; MAT 021B &amp; MAT 021C</td>
<td>Calculus and Calculus and Calculus</td>
</tr>
<tr>
<td>MAT 022A &amp; 022AL or MAT/BIS 027A</td>
<td>Linear Algebra and Linear Algebra Computer Laboratory and Linear Algebra with Applications to Biology</td>
</tr>
</tbody>
</table>

Philosophy

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHI 012</td>
<td>4</td>
</tr>
<tr>
<td>PHI 013G</td>
<td>4</td>
</tr>
</tbody>
</table>

Psychology

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC 001 or PSC 001Y</td>
<td>4</td>
</tr>
</tbody>
</table>

Research Methods

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC 041</td>
<td>4</td>
</tr>
</tbody>
</table>

Statistics

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA 013 or STA 100</td>
<td>4</td>
</tr>
</tbody>
</table>

Preparatory Subject Matter Subtotal 60

Depth Subject Matter

Group A: Core

All courses from Group A: 12

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC 100 or PSC 100Y</td>
<td>4</td>
</tr>
<tr>
<td>PHI 112</td>
<td>4</td>
</tr>
</tbody>
</table>

Group B: Computation

Choose three from Group B: 12

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS 120</td>
<td>4</td>
</tr>
<tr>
<td>ECS 170</td>
<td>4</td>
</tr>
<tr>
<td>ECS 171</td>
<td>4</td>
</tr>
<tr>
<td>LIN 177</td>
<td>4</td>
</tr>
<tr>
<td>PHI 133</td>
<td>4</td>
</tr>
</tbody>
</table>

Group C: Neuroscience

Choose one from Group C: 4

<table>
<thead>
<tr>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGS 107/ PSC 133/ECN 107</td>
<td>4</td>
</tr>
<tr>
<td>LIN 175</td>
<td>4</td>
</tr>
<tr>
<td>PSC 101</td>
<td>4</td>
</tr>
</tbody>
</table>

Notes:

1. CGS Topical Course: one upper division CGS course
2. Cognitive Neuroscience: The Biological Foundations of the Mind
Cognitive Science, Bachelor of Science

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 (which do not overlap with the Group C course): 15-18
PSC 101  Introduction to Biological Psychology
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
PSC 136  Psychology of Music
PSC 137  Neurobiology of Learning & Memory
PSC 140  Developmental Psychology
PSC 141  Cognitive Development

Depth Subject Matter Subtotal: 47-50

Total Units: 107-110

1 For a list of approved CGS Topical Courses, please see the major worksheet (https://ucdavis.app.box.com/file/458212968122/?s=iu3cbty5n5aimx4vh5vkn26scl1bcqq4).
2 PSC 101 and PSC 135 can be used for either Group C or Group F, but not both.

Neuroscience Emphasis

Code  Title  Units
Preparatory Subject Matter
Cognitive Science
CGS 001/PHI 010  Introduction to Cognitive Science  4

Biological Science
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

Linguistics
LIN 001  Introduction to Linguistics  4
or LIN 001Y  Introduction to Linguistics

Mathematics
Choose a series: 12
MAT 017A  Calculus for Biology & Medicine
& MAT 017B  Calculus for Biology & Medicine
& MAT 017C  Calculus for Biology & Medicine
MAT 021A  Calculus
& MAT 021B  Calculus
& MAT 021C  Calculus

Philosophy
PHI 013G  Minds, Brains, & Computers with Discussion  4

Physics
Choose a series: 12-15
PHY 007A  General Physics
& PHY 007B  and General Physics
& PHY 007C  and General Physics
PHY 009A  Classical Physics
& PHY 009B  and Classical Physics
& PHY 009C  and Classical Physics

Psychology
PSC 001  General Psychology  4
or PSC 001Y  General Psychology

Research Methods
PSC 041  Research Methods in Psychology  4

Statistics
STA 013  Elementary Statistics  4
or STA 100  Applied Statistics for Biological Sciences

Preparatory Subject Matter Subtotal: 63-66

Depth Subject Matter
Group A: Core
All courses from Group A: 13
NPB 100  Neurobiology
PSC 103A  Statistical Analysis of Psychological Data
CGS Topical Course: one upper division CGS course

Group B: Computation
Choose one from Group B: 4-5
LIN 177  Computational Linguistics
NPB 167  Computational Neuroscience (offered very irregularly)
NPB 100  Neurobiology

Group C: Neuroscience
Choose 12-13 units from Group C: 12-13
CGS 107/ PSC 133/ECN 107  Neuroeconomics/Reinforcement Learning & Decision Making
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
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC 121</td>
<td>Physiological Psychology</td>
</tr>
<tr>
<td>PSC 123</td>
<td>Hormones &amp; Behavior (3 units)</td>
</tr>
<tr>
<td>PSC 135</td>
<td>Cognitive Neuroscience: The Biological Foundations of the Mind</td>
</tr>
<tr>
<td>PSC 139</td>
<td>Advanced Cognitive Neuroscience</td>
</tr>
<tr>
<td>PSC 145</td>
<td>Developmental Cognitive Neuroscience</td>
</tr>
</tbody>
</table>

Choose two from Groups D or E: 8

**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 two from Group F (which do not overlap with courses selected for Group C): 7
- PSC 100 or PSC 100Y Introduction to Cognitive Psychology
- PSC 101 Introduction to Biological Psychology
- PSC 113 Developmental Psychobiology
- PSC 121 Physiological Psychology
- 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
- PSC 136 Psychology of Music
- PSC 137 Neurobiology of Learning & Memory
- PSC 140 Developmental Psychology
- PSC 141 Cognitive Development

**Depth Subject Matter Subtotal** 44-46

**Total Units** 107-112

---

1 For a list of approved CGS Topical Courses, please see the major worksheet (https://ucdavis.app.box.com/file/458205152398/?s=7ieIx128tp4i3qq5ajxe5hw2wy23).

2 PSC 101, PSC 121, and PSC 135 can be used for either Group C or Group F, but not both.