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>CGS 001/PHI 010</td>
<td>Introduction to Cognitive Science</td>
<td>4</td>
</tr>
<tr>
<td>ECS 020</td>
<td>Discrete Mathematics For Computer Science</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose a series: 12

- ECS 032A & ECS 032B & ECS 034
  - Introduction to Programming and Introduction to Data Structures and Software Development in UNIX & C++ (pre-req is ECS 032C)

Linguistics

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

Mathematics

Choose a series: 12

- MAT 017A & MAT 017B & MAT 017C
  - Calculus for Biology & Medicine

OR

- MAT 021A & MAT 021B & MAT 021C
  - Calculus

- MAT 022A & 022AL
  - Linear Algebra and Linear Algebra Computer Laboratory
  or MAT/BIS 027A
  - Linear Algebra with Applications to Biology

Philosophy

- PHI 012 Introduction to Symbolic Logic 4
- PHI 013G Minds, Brains, & Computers with Discussion 4

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 60

Depth Subject Matter

Group A: Core

All courses from Group A: 12

- PSC 100 Introduction to Cognitive Psychology
  or PSC 100Y Introduction to Cognitive Psychology
- PHI 112 Intermediate Symbolic Logic

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

1 Additional course must have a minimum CGS requirement of 4 units.
2 Additional course must have a minimum CGS requirement of 4 units.
## Cognitive Science, Bachelor of Science

### Preparatory Subject Matter

#### Cognitive Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGS 001</td>
<td>Introduction to Cognitive Science</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Biological Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BIS 002B</td>
<td>Introduction to Biology: Principles of Ecology &amp; Evolution</td>
<td>5</td>
</tr>
<tr>
<td>BIS 002C</td>
<td>Introduction to Biology: Biodiversity &amp; the Tree of Life</td>
<td>5</td>
</tr>
</tbody>
</table>

### Depth Subject Matter

#### Group A: Core

All courses from Group A:

- NPB 100 Neurobiology
- PSC 103A Statistical Analysis of Psychological Data

### Group B: Computation

Choose one from Group B:

- LIN 177 Computational Linguistics
- NPB 167 Computational Neuroscience (offered very irregularly)

### Group C: Neuroscience

Choose 12-13 units from Group C:

- 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

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### Neuroscience Emphasis

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>PSC 135</td>
<td>Cognitive Neuroscience: The Biological Foundations of the Mind</td>
<td>2</td>
</tr>
<tr>
<td>PSC 139</td>
<td>Advanced Cognitive Neuroscience</td>
<td></td>
</tr>
<tr>
<td>PSC 145</td>
<td>Developmental Cognitive Neuroscience</td>
<td></td>
</tr>
</tbody>
</table>

Choose one from Group D or E:

#### 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):

- 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

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1 For a list of approved CGS Topical Courses, please see the major worksheet (https://ucdavis.app.box.com/file/458212968122/?s=iu3cyb5n5aimx4xvksn26scb1bcq4).

2 PSC 101 and PSC 135 can be used for either Group C or Group F, but not both.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>NPB 164</td>
<td>Mammalian Vision</td>
<td></td>
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<tr>
<td>NPB 165</td>
<td>Neurobiology of Speech Perception (3 units)</td>
<td></td>
</tr>
<tr>
<td>PSC 101</td>
<td>Introduction to Biological Psychology</td>
<td>2</td>
</tr>
<tr>
<td>PSC 121</td>
<td>Physiological Psychology</td>
<td>2</td>
</tr>
<tr>
<td>PSC 123</td>
<td>Hormones &amp; Behavior (3 units)</td>
<td></td>
</tr>
<tr>
<td>PSC 135</td>
<td>Cognitive Neuroscience: The Biological Foundations of the Mind</td>
<td>2</td>
</tr>
<tr>
<td>PSC 139</td>
<td>Advanced Cognitive Neuroscience</td>
<td></td>
</tr>
<tr>
<td>PSC 145</td>
<td>Developmental Cognitive Neuroscience</td>
<td></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 Introduction to Cognitive Psychology
- 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=7ieix1z8rp4i3q5jzxe5h2bmw2wy23](https://ucdavis.app.box.com/file/458205152398/?s=7ieix1z8rp4i3q5jzxe5h2bmw2wy23)).

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