## Areas of Specialization

The Department of Cognitive Science offers optional "areas of specialization" within the Cognitive Science major for the BS degree only.

The areas of specialization are intended to provide majors with guidance in choosing elective courses and to make the specific interests and training of a major clear to prospective employers and graduate schools. Specifying an area of specialization is optional; however, students should take into consideration that approved courses are not necessarily offered every year, when planning for their specialization.

To major in Cognitive Science with an area of specialization, students must fulfill the requirements for the BS degree and must choose 4 of the required 6 electives from the list of approved electives for that area of specialization.

At least 3 of your 6 total electives must be taken within the Cognitive Science Department (COGS courses).

A COGS 199 may be allowed for elective credit within the specialization if the research project was clearly in one of the specialization areas. The specialization area will be listed on the transcript.

### Neuroscience Specialization
Major Code: CG29

This area of specialization is intended for majors interested in neuroscience research or medicine. Allowed electives include courses in cognitive neuroscience, organic chemistry, biochemistry, and physiology.

**Cognitive Science**
- COGS 116: Developmental Cognitive Neuroscience
- COGS 143: Animal Cognition
- COGS 154: Comm. Disorders Child/Adults
- COGS 160: Sem. Special Topics (if topic applies)
- COGS 163: Metabolic Disorders of the Brain
- COGS 164: Neurobiology of Motivation
- COGS 165: Neuroimaging of Cognition
- COGS 169: Genetic Information for Behavior
- COGS 170: Brain Waves Across Scales
- COGS 171: Mirror neuron System
- COGS 172: Brain Disorders and Cognition
- COGS 174: Drugs, Brain, Mind, and Culture
- COGS 175: The Neuropsychological Basis of Alternate States of Consciousness
- COGS 176: From Sleep to Attention

**Biochemistry**
- BIBC 100: Structural Biochemistry
- BIBC 102: Metabolic Biochemistry

**Biological Animal Physiology and Neuroscience**
- BIPN 100: Human Physiology I
- BIPN 105: Animal Physiology I Lab
- BIPN 144: Developmental Neurobiology
- BIPN 146: Computational Neurobiology
- BIPN 148: Cellular Basis of Learning and Memory

**Chemistry**
- CHEM 143B: Organic Chemistry Laboratory
- CHEM 143C: Organic Chemistry Laboratory

**Linguistics**
- LIGN 180: Language Representation in the Brain
- LIGN 181: Language Processing in the Brain

**Psychology**
- PSYC 123: Cognitive Control and Frontal Lobe Function
- PSYC 132: Hormones and Behavior
- PSYC 133: Circadian Rhythms – Biological Clock
- PSYC 150: Cognitive Neuroscience of Vision
- PSYC 168: Psych. Disorders of Childhood
- PSYC 169: Brain Damage and Ment. Func.
- PSYC 174: Visual Cognition
- PSYC 179: Drugs, Addiction, Mental Disorders
- PSYC 180: Human Behavior Lab.
- PSYC 181: Drugs and Behavior
- PSYC 182: Illusions and the Brain

### Clinical Aspects of Cognition Specialization
Major Code: CG31

This area of specialization is intended for majors interested in cognitive neuropsychology, psychiatry, cognitive disorders, and the effects of drugs and brain damage on cognitive functions. Allowed electives include courses in those topics, as well as organic chemistry, biochemistry and physiology.

**Cognitive Science**
- COGS 154: Communication Disorders in Children + Adults
- COGS 163: Metabolic Disorders of the Brain
- COGS 165: Neuroimaging of Cognition
- COGS 171: Mirror neuron System
- COGS 172: Brain Disorders and Cognition
- COGS 174: Drugs, Brain, Mind and Culture
- COGS 175: The Neuropsychological Basis of Alternate States of Consciousness
- COGS 176: From Sleep to Attention

**Biochemistry**
- BIBC 100: Structural Biochemistry
- BIBC 102: Metabolic Biochemistry

**Biological Animal Physiology and Neuroscience**
- BIPN 100: Human Physiology I
- BIPN 105: Animal Physiology Lab

**Psychology**
- PSYC 100: Clinical Psychology
- PSYC 116: Lab in Clinical Psychology Research
- PSYC 120: Learning and Motivation
- PSYC 124: Clinical Assessment and Treatment
- PSYC 125: Clinical Neuropsychology
- PSYC 134: Eating Disorders
- PSYC 140: Human Behavior Lab.
- PSYC 154: Behavior Modification
- PSYC 155: Social Psychology and Medicine
- PSYC 168: Psych. Disorders of Childhood
- PSYC 169: Brain Damage and Mental Functions
- PSYC 170: Cognitive Neuropsychology
- PSYC 179: Drugs, Addiction, Mental Disorders
- PSYC 181: Drugs and Behavior
- PSYC 188: Impulse Control Disorders

### Language and Culture Specialization
Major Code: CG34

This area of specialization is intended for majors whose primary interests include human psychology and applications of cognitive science in design and engineering. Allowed electives include courses in cognitive development, language, laboratory research of cognition, anthropology and sociology.

**Cognitive Science**
- COGS 110: The Developing Mind
- COGS 112: Humor
- COGS 143: Animal Cognition
- COGS 144: Social Cognition
- COGS 151: Analyze and Conceptual Systems
- COGS 152: Cognitive Foundations of Math
- COGS 153: Language Comprehension
- COGS 154: Comm. Disorders Child/Adults
- COGS 155: Gesture and Cognition
- COGS 156: Language Development
- COGS 157: Music and the Mind
- COGS 160: Sem Special Topics (if topic applies)
- COGS 171: Mirror Neuron System
- Plus COGS 101C when not used for core sequence

**Linguistics**
- LIGN 148: Psycholinguistics of Sign Language
- LIGN 155: Evolution of Language
- LIGN 170: Psycholinguistics
- LIGN 171: Child Lang Acquisition
- LIGN 174: Gender and Language in Society *
- LIGN 175: Sociolinguistics
- LIGN 180: Language Representation in the Brain
- LIGN 181: Language Processing in the Brain

**Psychology**
- PSYC 115A: Lab in Cognitive Psychology I
- PSYC 115B: Lab in Cognitive Psychology II
- PSYC 128: Psychology of Reading
- PSYC 145: Psychology of Language
- PSYC 156: Cognitive Development In Infancy

**Sociology**
- SOCI 116: Gender and Language in Society *

*Students can take either LIGN 174 or SOCI 116 but not both.*
**DESIGN AND INTERACTION SPECIALIZATION**

**Major Code: CG33**

This area of specialization is intended for majors interested in human computer interaction, web, visualization, and applications of cognitive science in design and engineering. Additional electives may be petitioned from communication, computer science, computer engineering and visual arts. Please note: We cannot guarantee enrollment in non-COGS courses (i.e., CSE, ECE, IACM) for HCI students since many of these majors are very impacted and priority is given to students in those majors.

**Cognitive Science**
- COGS 102A: Cognitive Perspectives
- COGS 102B: Cognitive Ethnography
- COGS 102C: Cognitive Design
- COGS 119: Programming/Experimental Res.
- COGS 120: Interaction Design
- COGS 121: HCI Portfolio Design Studio
- COGS 122: Interaction Design Startup
- COGS 123: Social Computing
- COGS 124: HCI Technical Systems Research
- COGS 125: Advanced Interaction Design
- COGS 126: Thinking with Computers
- COGS 127: Data-Driven UX/Product Design
- COGS 128: Information Visualization
- COGS 160: Sem Special Topics (if topic applies)
- COGS 187A: Usability & Info. Architecture
- COGS 187B: Practicum in Pro Web Design
- COGS 188: Artificial Intelligence Algorithm
- COGS 189: Brain Computer Interfaces

**Communication**
- COMM 101E: Media Production Lab:
  - Ethnographic Methods for Media Production
- COMM 101M: Media Production Lab:
  - Communicating and Computers
- COMM 102C: Practicum in New Media & Community Life
- COMM 105G: Computer Games Studies
- COMM 106: Internet Industry
- COMM 110T: LLC: Language, Thought & Media
- COMM 120N: Advanced Media Production:
  - News Media Workshop
- COMM 124A: Critical Design: Advanced Studio
- COMM 124B: Critical Design: Topic Studio
- COMM 151: The Information Age: Fact & Fiction
- COMM 173: Interaction with Technology

**Computer Science**
- CSE 100: Advanced Data Structures
- CSE 101: Design and Analysis of Algorithms
- CSE 110: Software Engineering
- CSE 118: Ubiquitous Computing
- CSE 130: Programming Lang: Principles and Paradigms
- CSE 132A: Database System Principles
- CSE 132B: Database Systems Applications
- CSE 134B: Web Client Languages
- CSE 135: Online Database Analytics Applications
- CSE 162: Intro Computer Vision
- CSE 165: 3D User Interaction
- CSE 167: Computer Graphics
- CSE 176A: Maker Topics: Health Care Robotics

**Electrical and Computer Engineering**
- ECE 161A: Introduction to Digital Signal Processing
- ECE 161B: Digital Signal Processing
- ECE 161C: Applications of Digital Signal Processing
- ECE 172A: Introduction to Intelligent Systems: Robotics and Machine Intelligence
- ECE 187: Introduction to Biomedical Imaging

**Education Studies**
- EDS 124AR: Teaching Comp. in a Digital World
- EDS 124BR: Teaching Comp. Thinking for Everyone

**Engineering**
- ENG 100D: Design for Development

**Mechanical and Aerospace Engineering**
- MAE 154: Product Design and Entrepreneurship

**Philosophy**
- PHIL 164: Technology and Human values

**Psychology**
- PSYC 161: Engineering Psychology

**Visual Arts**
- VIS 135: Design Research Methods
- VIS 143: Virtual Environments
- VIS 145A: Time- and Process-Based Digital Media I
- VIS 145B: Time- and Process-Based Digital Media II
- VIS 147A: Electronic Technologies for Art I
- VIS 147B: Electronic Technologies for Art II
- VIS 149: Seminar in Contemporary Computer Topics
- VIS 161: Systems and Networks at Scale
- VIS 162: Speculative Science and Design Invention
- VIS 163: Design Research and Criticism
- VIS 176: 16mm Filmmaking
- VIS 177: Scripting Strategies
- VIS 180A: Documentary Evidence and the Construction of Authenticity in Current Media Practices
- VIS 180B: Fiction and Allegory in Current Media Practices
- VIS 182: Advanced Editing

**Biological-Animal Physiology and Neuroscience**
- BIPN 164: Computational Neurobiology

**MACHINE LEARNING AND NEURALCOMPUTATION SPECIALIZATION**

**Major code: CG35**

This area of specialization is intended for majors interested in computational and mathematical approaches to modeling cognition or building cognitive systems, theoretical neuroscience, as well as software engineering and data science. Allowed electives include advanced courses in neural networks, artificial intelligence, and computer science.

**Cognitive Science**
- COGS 109: Modeling and Data Analysis
- COGS 118A: Supervised Machine Learning Algorithms
- COGS 118B: Introduction to Machine Learning II
- COGS 118C: Neural Signal Processing
- COGS 118D: Stats/Behavioral Data Analysis
- COGS 137: Practical Data Science in R
- COGS 138: Neural Data Science
- COGS 160: Sem Special Topics (if topic applies)
- COGS 180: Decision Making in the Brain
- COGS 182: Introduction to Reinforcement Learning
- COGS 186: Artificial Intelligence Algorithms
- COGS 189: Brain Computer Interfaces

**Cross-Campus Online**
- CMN 152V: Social Science w/ Online Data (UC Davis)
- CMN 170: The Digital Revolution and Social Change (UC Davis)
- CMN 176: Video Game (UC Davis)

Visit crossenroll.universityofcalifornia.edu to enroll

*Students specializing in Machine Learning and Neural Computation must choose 2 electives from: COGS 118A-B-C-D. These courses require MATH 20C-E, 180A, and COGS 18 or CSE 11 as prerequisites.**

**Math**
- MATH 170A: Intro to Numerical Analysis: Linear Algebra
- MATH 170B: Intro to Numerical Analysis: Approx./Non Lin. Eq.
- MATH 180A: Intro to Probability
- MATH 180B: Intro. to Stochastic Processes I
- MATH 180C: Intro. to Stochastic Processes II
- MATH 189: Exploratory Data Analysis and Inference

**Management**
- MGT 153: Business Analytics

**Cross-Campus Online**
- CMN 150V: Computational Social Science (UC Davis)
- CMPE 107: Prob/Stats for Engineers (UC Santa Cruz)

**Computer Science and Engineering**

**Math**
- MATH 170A: Intro to Numerical Analysis: Linear Algebra
- MATH 170B: Intro to Numerical Analysis: Approx./Non Lin. Eq.
- MATH 180A: Intro to Probability
- MATH 180B: Intro. to Stochastic Processes I
- MATH 180C: Intro. to Stochastic Processes II
- MATH 189: Exploratory Data Analysis and Inference

**Philosophy**
- PHIL 164: Technology and Human values

**Engineering**
- ENG 100D: Design for Development

**Mechanical and Aerospace Engineering**
- MAE 154: Product Design and Entrepreneurship

**Psychology**
- PSYC 161: Engineering Psychology

**Visual Arts**
- VIS 135: Design Research Methods
- VIS 143: Virtual Environments
- VIS 145A: Time- and Process-Based Digital Media I
- VIS 145B: Time- and Process-Based Digital Media II
- VIS 147A: Electronic Technologies for Art I
- VIS 147B: Electronic Technologies for Art II
- VIS 149: Seminar in Contemporary Computer Topics
- VIS 161: Systems and Networks at Scale
- VIS 162: Speculative Science and Design Invention
- VIS 163: Design Research and Criticism
- VIS 176: 16mm Filmmaking
- VIS 177: Scripting Strategies
- VIS 180A: Documentary Evidence and the Construction of Authenticity in Current Media Practices
- VIS 180B: Fiction and Allegory in Current Media Practices
- VIS 182: Advanced Editing

**Cross-Campus Online**
- CMN 152V: Social Science w/ Online Data (UC Davis)
- CMN 170: The Digital Revolution and Social Change (UC Davis)
- CMN 176: Video Game (UC Davis)