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, student 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 119: Programming/Experimental Res.
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 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: Neuropsychological/States of Consciousness
COGS 176: From Sleep to Attention
COGS 177: Space and Time in the Brain
COGS 178: Genes, Brains, and Behavior
COGS 179: Electrophysiology of Cognition
COGS 180: Decision Making in the Brain
COGS 184: Modeling the Evolution of Cognition

### MACHINE LEARNING AND NEURAL COMPUTATION 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: Intro to Machine Learning II
COGS 118C: Neural Signal Processing
COGS 118D: Math. Stat. for Behavioral Data Analysis
COGS 160: Sem Special Topics (if topic applies)
COGS 180: Decision Making in the Brain
COGS 185: Adv. Machine Learning Methods
COGS 188: Artificial Intelligence Algorithms
COGS 189: Brain Computer Interfaces

### Biological-Animal Physiology and Neuroscience
BIPN 146: Computational Neurobiology

#### Computer Science and Engineering**
CSE 100: Computer Data Structures
CSE 101: Design and Analysis of Algorithms
CSE 102: Storage System Architectures
CSE 105: Theory of Computability
CSE 130: Program Lang: Prin. and Paradigms
CSE 131: Compiler Construction
CSE 150A: Intro to AI: Prob. Reasoning & Decision-Making
CSE 150B: Intro to AI: Search & Reasoning
CSE 151A: Intro to Machine Learning
CSE 151B: Deep Learning
CSE 160: Intro to Parallel Computation

### Linguistics
LIGN 167: Deep Learning for Nat. Lang. Understanding

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

### Cross-Campus Online
CMN 150V: Computational Social Science (UC Davis)
CMPE 107: Prob/Stats for Engineers (UC Santa Cruz)
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, 18, 180A, and COGS 18 or CSE 11 as prerequisites. ** We cannot guarantee these courses for CogSci majors as many CSE courses are very impacted.

### 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 119: Programming/Experimental Research
COGS 143: Animal Cognition
COGS 144: Social Cognition
COGS 151: Analog 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
SOCI 117: Language, Culture, and Education
SOCI 118E: Sociology of Language

*Students can take either LIGN 174 or SOCI 116 but not both.*
## 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 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

### Biology-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

### Cross-Campus Online
- PSY BEH 102C: Abnormal Psychology (UC Irvine)

Visit crossenroll.universityofcalifornia.edu to enroll

## 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, ICAM) 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 Programming Studio
- COGS 122: Interaction Design Startup
- COGS 123: Social Computing
- COGS 124: HCI Technical Systems Research
- COGS 125: Advanced Interaction Design
- COGS 128: Designing Human-Data Interactions
- COGS 128: Information Visualization
- COGS 128: HCI Technical Systems Research
- COGS 128: Advanced Interaction Design
- COGS 128: Designing Human-Data Interactions
- COGS 128: Information Visualization
- COGS 128: HCI Technical Systems Research
- COGS 128: Advanced Interaction Design
- COGS 128: Designing Human-Data Interactions
- 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 106I: 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 171: The Information Age: Fact and Fiction
- COMM 173: Interaction with Technology

### Computing and the Arts
- VIS 143: Virtual Environments

### 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 150: Introduction to Artificial Intelligence: Search and Reasoning
- CSE 151: Introduction to Artificial Intelligence: Statistical Approaches
- CSE 152: Intro Computer Vision
- CSE 165: 3D User Interaction
- CSE 167: Computer Graphics
- CSE 176A: Maker Topics: Health Care Robotics

### Design
- DSGN 100: Prototyping

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

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

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

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

### Psychology
- PSYC 161: Engineering Psychology

### Visual Arts
- VIS 135: Design Research Methods
- 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 170: The Digital Revolution and Social Change (UC Davis)

Visit crossenroll.universityofcalifornia.edu to enroll