

# 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 115: Neuro. Dev. and Cog. Change  
 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  
 Plus any COGS 107 not used for core sequence

### Biochemistry

BIBC 100: Structural Biochemistry  
 BIBC 102: Metabolic Biochemistry

### Biology-Animal Physiology and Neuroscience

BIPN 100: Human Physiology I  
 BIPN 105: Animal Physiology 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 Damg and Ment. Func.  
 PSYC 174: Visual Cognition  
 PSYC 179: Drugs, Adds., & Ment. Disord.  
 PSYC 181: Drugs and Behavior  
 PSYC 182: Illusions and the Brain

## 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 181: Neur. Net. Models of Cognition  
 COGS 185: Adv. Machine Learning Methods  
 COGS 188: Artificial Intelligence Algorithms  
 COGS 189: Brain Computer Interfaces

### Biology-Animal Physiology and Neuroscience

BIPN 146: Computational Neurobiology

### Computer Science and Engineering\*\*

CSE 100: Advanced 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](http://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: Analogy 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](http://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 126: Human-Computer Interaction  
 COGS 127: 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 151: The Information Age: Fact and Fiction  
 COMM 172: Adv. Studies in Mediation and Interaction  
 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 114: Cog. Development/Interactive Computing Env.  
 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](http://crossenroll.universityofcalifornia.edu) to enroll