## Areas of Specialization

**COGS 110: The Developing Mind**
- COGS 112: Humor
- 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

- 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: The Neuropsychological Basis of Alternate States of Consciousness
- COGS 176: From Sleep to Attention

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

**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

**PSYC 100: Clinical Psychology**
- PSYC 115B: Lab in Cognitive Psychology
- PSYC 116: Lab in Clinical Psychology Research

**PSYC 115: Social Psychology and Medicine**
- PSYC 128: Psychology of Reading

**PSYC 132: 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, Addns., & Ment. Disord.

**PSYC 181: Drugs and Behavior**
- PSYC 182: Illusions and the Brain

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

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

**LIGN 155: Evolution of Language**
- LIGN 170: Psycholinguistics
- LIGN 171: Child Lang Acquisition

**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, Addns., & Ment. Disord.
- PSYC 181: Drugs and Behavior
- PSYC 182: Illusions and the Brain

**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.

- 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: 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
- 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 100: Clinical Psychology
- PSYC 115B: Lab in Cognitive Psychology
- PSYC 116: Lab in Clinical Psychology Research

**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.

**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

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

**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 100: Clinical Psychology
- PSYC 105: Animal Physiology Lab
- PSYC 115: 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

- PSYC 125: Clinical Neuropsychology
- PSYC 128: Psychology of Reading
- PSYC 145: Psychology of Language
- PSYC 156: Cognitive Development in Infancy
- PSYC 157: Music and the Mind

**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.

**COGS 110: The Developing Mind**
- COGS 112: Humor
- 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

**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

**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*
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 HCl 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/Start-Up
COGS 123: Social Computing
COGS 124: HCI Technical Systems Research
COGS 125: Advanced Interaction Design
COGS 126: Human-Computer Interaction
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 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 & Fiction
COMM 172: Adv. Studies in Mediation and Interaction
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 152: Intro Computer Vision
CSE 165: 3D User Interaction
CSE 167: Computer Graphics
CSE 176A: Maker Topics: Health Care Robotics

**Design**

DSGN 100: Prototyping
DSGN 160: Special Topics in Design

**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

**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

**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: Introduction to Machine Learning II *
COGS 118C: Neural Signal Processing *
COGS 118D: Stats/Behavioral Data Analysis *
COGS 160: Sem Special Topics (if topic applies)
COGS 180: Decision Making in the Brain
COGS 182: Introduction to Reinforcement Learning
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 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 152A: Introduction to Computer Vision I
CSE 152B: Introduction to Computer Vision II
CSE 156: Statistical Natural Language Processing
CSE 160: Intro to Parallel Computation

**Electrical and Computer Engineering**

ECE 175A: Elements of Machine Intelligence: Prob. Reasoning & Graphical Models
ECE 176: Introduction to Deep Learning & Applications

**Linguistics**

LING 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 Differential Equations
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, 180A, and COGS 18 or CSE 11 as prerequisites.

** We cannot guarantee these courses forCogSci majors as many CSE courses are very impacted.