Areas of Specialization

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

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 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 179: Electrophysiology of Cognition
COGS 180: Neural Coding/Sensory Systems
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: Mammalian 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 140A: Organic Chemistry I
CHEM 140B: Organic Chemistry II
CHEM 140C: Organic Chemistry III
CHEM 143A: Organic Chemistry Laboratory
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, Addrs., & 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 118A: Natural Computation I
COGS 118B: Natural Computation II
COGS 118C: Neural Signal Processing
COGS 118D: Math. Stat. for Behavioral Data Analysis
COGS 160: Sem Special Topics (if topic applies)
COGS 166: Neural Coding/Sensory Systems
COGS 188: AI Algorithm and Social Language
COGS 189: Brain Computer Interfaces

PipBN 146: Computational Neurobiology

Math
MATH 170A: Numerical/Linear Algebra
MATH 170B: Numerical/Approx + Nonlinear
MATH 170C: Numerical/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/Inference

* Students specializing in Machine Learning and Neural Computation must choose 2 electives from this group: Cogs 118A, 118B, 118C, and 118D. These courses require MATH 20E, MATH 18, & MATH 180A as pre-requisites.

** We cannot guarantee these courses for Cog Sci majors as many CSE courses are very impacted. Also, CSE 102, and 160 may not be offered on a regular basis.

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 102A or 102B when not used for core sequence

Linguistics
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
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: Mammalian Physiology I
- BIPN 105: Animal Physiology Lab

### Chemistry
- CHEM 140A: Organic Chemistry I
- CHEM 140B: Organic Chemistry II

### Psychology
- PSYC 100: Clinical Psychology
- PSYC 116: Lab in Clinical Psychology Research
- PSYC 120: Learning and Motivation
- PSYC 125: Clinical Neuropsychology Assessment
- PSYC 124: Introduction to Clinical Psychology
- PSYC 134: Eating Disorders
- PSYC 140: Lab/Human Behavior
- 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

### 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 119: Programming/Experimental Res.
- COGS 120: Human Computer Interaction
- COGS 121: HCI Programming
- COGS 122: Interaction Design Startup
- COGS 123: Social Computing
- COGS 124: HCI Technical Systems Research
- COGS 160: Sem Special Topics (if topic applies)
- COGS 187A: Cognitive Aspects of Multimedia Design
- COGS 187B: Cognitive Aspects of Multimedia Design II
- COGS 188: AI Algorithm & Social Language
- COGS 189: Brain Computer Interfaces
- Plus any COGS 102 not used for core sequence

### Communication
- COMM 101E: Media Production Lab: Ethnographic Methods for Media Production
- COMM 101M: Media Production Lab: Interact in New Media & Community Life
- COMM 107G: Computer Games Studies
- COMM 107I: Language, Thought & Media
- COMM 107J: Critical Design
- COMM 112M: Communication and Social Machines
- COMM 120N: Advanced Media Production: News Media Workshop
- COMM 124A: Critical Design: Advanced Studio
- COMM 151: The Information Age: In Fact and Fiction
- COMM 173: Interaction with Technology

### Computing and the Arts
- ICAM 101: Digital Imaging: Image and Interactivity
- ICAM 102: Digital Media I: Time, Movement, Sound
- ICAM 120: Virtual Environments
- ICAM 130: Seminar in Contemporary Computer Topics

### Computer Science
- CSE 100: Advanced Data Structures
- CSE 101: Design and Analysis of Algorithms
- CSE 102: Storage System Architectures
- CSE 111: Object Oriented Software Design
- CSE 118: Ubiquitous Computing
- CSE 130: Programming Lang: Principles and Paradigms
- CSE 132A: Database System Principles
- CSE 132B: Database Systems Applications
- CSE 133: Information Retrieval
- CSE 134A: Web Server Languages
- CSE 134B: Web Client Languages
- CSE 135: Server-side Web 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 171: User Interface 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

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

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

### Psychology
- PSYC 161: Introduction to Engineering Psychology