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.

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Location: Cognitive Science Building / Room 139

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: 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 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 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: Intro to Machine Learning I *
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: Neural Coding/Sensory Systems
COGS 181: Neur. Net. Models of Cognition
COGS 185: Adv. Machine Learning Methods
COGS 188: AI Algorithm and Social Language
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 150: Intro to AI: Search and Reasoning
CSE 151: Intro to AI: Statistical Approaches
CSE 160: Intro to Parallel Computation

Linguistics

LIGN 167: Deep Learning for Nat. Lang. Understanding

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 20C, 20E, MATH 18, MATH 180A, and CSE 8B or 11 as prerequisites.

** We cannot guarantee these courses for CogSci 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: 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: Sociolinguisitics
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: Mammalian 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 125: Clinical Neuropsychology Assessmnt
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 125: Advanced Interaction Design
COGS 126: Human-Computer Interaction
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: 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 112M: Communication and Social Machines
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: In Fact and Fiction
COMM 172: Adv. Studies in Mediation and Interaction
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 110: Software Engineering
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
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: Introduction to Engineering Psychology

Visual Arts

VIS 140: Digital Imaging: Image and Interactivity
VIS 145A: Digital Media I: Time, Movement, Sound
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 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
VIS 186: Advanced Filmmaking Strategies