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.

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

<table>
<thead>
<tr>
<th>Major code: CG29</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 psychology.</td>
</tr>
</tbody>
</table>

#### 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: 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 160: 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, Add., & Ment. Disorder.
- PSYC 181: Drugs and Behavior
- PSYC 182: Illusions and the Brain

### MACHINE LEARNING AND NEURAL COMPUTATION SPECIALIZATION

<table>
<thead>
<tr>
<th>Major code: CG35</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

#### Cognitive Science

- 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 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

#### 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


#### Math

- MATH 170A: Numerical/Linear Algebra
- MATH 170B: Numerical/Approx + Nonlinear
- MATH 170C: Numerical/Differential Equations
- MATH 180A: Introduction to Probability
- MATH 180B: Intr. to Stochastic Processes I
- MATH 180C: Intr. 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 as prerequisites.

** 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

<table>
<thead>
<tr>
<th>Major code: CG34</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

#### 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

#### 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.
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 these 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

**Biological-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 Assesmnt
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

**Mandatory Courses**
COGS 101: Introduction to Cognitive Science
COGS 102: Applications of Cognitive Science

**Elective Requirements**
- **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

- **Biology-Animal Physiology and Neuroscience**
  - BIBC 100: Structural Biochemistry
  - BIBC 102: Metabolic Biochemistry

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

- **Clinical Aspects of Cognition Specialization**
  - Major Code: CG31

- **Design and Interaction Specialization**
  - Major Code: CG33

- **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

- **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 151T: The Information Age: In Fact and Fiction
  - COMM 173: Interaction with Technology

- **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

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