

January 2001, Effective Fall 2001
Social Sciences Interdisciplinary Program
Cognitive Science B.A.

Cognitive Science is an interdisciplinary approach to how the mind works. It investigates thought and consciousness, the senses and the emotions, the structure of language, cultural patterns, neural organization, and computational analogs of mental processes. It examines how these areas interact, how they develop in the growing human, and how they appear in other animals.

Overview

This major requires a minimum of 42 credit hours, including one prerequisite course (3 credits), six required courses (18+ credits), three credits of 'Cognitive Science Colloquium' attendance, and either six courses in a focus area (18+ credits) or five courses and a senior thesis in a focus area (18+ credits).

Advising

Students interested in the Cognitive Science BA should consult with the SSI Director, Dr. Lee Dryden, for general advising. Dr. Dryden will direct the student to the current Cognitive Science Academic Advisor, for advising on planning coursework and selecting an appropriate focus area. When a student has decided on a focus area, the academic advisor may also direct the student to a faculty member who is a member of the Cognitive Science Center and whose expertise is in this focus area, as a secondary academic advisor. This secondary advisor will typically be the advisor of the student's senior thesis, if the student chooses to write one.

Acceptance Criteria

A student may be accepted into the Cognitive Science major after having successfully completed the prerequisite course PSY 248, 'Introduction to Cognitive Science' (3 credits), with a grade of "B-" or better. Students may take this course in their freshman year, and be accepted into the major at the beginning of their Sophomore year. However, freshmen interested in pursuing this major may meet with Dr. Dryden for advising during their freshman year.

Academic Progress Requirement

In order to remain in good academic standing, the student must maintain a QPA of at least 2.50 each semester in the courses taken as part of the Cognitive Science program (both required courses and electives). The student must continue to complete more than 75% of the credit hours for which he/she registers. In addition, all courses to be applied to the Cognitive Science major must be completed with a grade of "C-" or better, with two exceptions. First, the student must obtain a grade of "B-" or better in the prerequisite course, as indicated in the above paragraph. Second, the student may apply one and only one course with a grade of "D" or "D+" toward the major

Required Courses (18+ credits)

Students are required to complete six core courses; three should be selected from the 'Methods' list and three from the 'Content' list below (some of these courses have prerequisites; see catalogue for details).

<u>Methods</u>	credits	<u>Content</u>	credits
• APY 320: Cognitive Anthropology	3	APY 344: Animal Communication	3
• CSE 113/114: Intro to Programming	4	PHI 108: Knowledge and Reality	3
• OR		OR	
• CSE 115/116: Intro to Computer Science	4	PHI 221: Introduction to the Philosophy of Science	3
• for Majors			
• PHI 215: Introduction to Deductive Logic	3	LIN 205: Introduction to Linguistic Analysis	3
• OR	3	OR	
• PHI 315: Symbolic Logic		LIN 207: Language, Society and the Individual	3
• PSY 207: Psychological Statistics	4	PSY 247: Cognitive Psychology	3
• PSY 250: Scientific Inquiry in Psychology	3		

Cognitive Science Colloquium: 3 credits (1 per semester)

Majors will attend the Cognitive Science Colloquia (SSC 391) for one credit per semester, repeated three times. The student will write a brief report based on the Colloquia, to be submitted at the end of the semester. The student's grade will be based on attendance and this final report.

Senior Thesis Option (3 credits)

The student will select an original topic, in collaboration with his/her Cognitive Science advisor, and during the course of one semester in the senior year, perform research on this topic and produce a written report. This report could be a research review, a report on an experiment, or a computational study. Students who take the Senior Thesis option will sign up for an independent study (499, for three credits) with their faculty advisor, and will be required to complete five rather than six other courses in their chosen focus area.

Focus Areas: (18+ credits, or 15+ credits for students who take the Senior Thesis Option).

Students will be required to complete their credits from courses in one of the following focus areas; courses must be drawn from at least two different departments. Courses from the core that are credits beyond above requirements may count toward the tracts below. NOTE: Prerequisites for courses are listed along with the courses and number of credits. Frequently prerequisites are guidelines as to appropriate background experience for a course. In many circumstances, listed prerequisites may be waivable through consultation with the instructor of a course and demonstrated appropriate background knowledge. For courses which are listed in the catalogue as 'majors only', see Dr. Dryden. Occasionally a course not listed below will contain appropriate content for the major; such courses will be approved as counting toward the major on a case-by-case basis.

Focus Areas***#1: Cognitive Development***

Growth, development and change characterize all living things. The cognitive development focus area allows students to explore how cognition changes ontogenetically (through the life cycle) as well as phylogenetically (across current and previously living species).

Course and Title	Prerequisites	Credits
• APY 344: Animal Communication		3
• APY 457: Evolutionary Biology of Humans		3
• CDS 301: Language Development in Children		3
• CDS 302: Language Disorders in Children	CDS 301 or LIN 355 or PSY 322	3
• CSE 474: Machine Learning	EAS 305 or STA 401	4
• LIN 320: Language and the Brain		3
• LIN 355: Child Language Development		3
• LIN 455: Language Acquisition	LIN 205	3
• NUR 250: Human Growth and Development		3
• PGY 424: Developmental Neurobiology	permission	3
• PSY 320: Adult Development and Aging		3
• PSY 322: Language Development		3
• PSY 346: Animal Cognition		3
• PSY 348: Psycholinguistics		3
• PSY 357: Cognitive Development		3
• PSY 430: Evolutionary Psychology		3

#2: Computational Modeling

This focus area focuses on the development of computational models of human cognition and perception processes. Symbolic and connectionist methods are involved as is theory of computation.

Course and Title	Prerequisites	Credits
• CSE 202: Programming in Lisp	CSE 116	1
• CSE 472: Knowledge-Based Artificial Intelligence	CSE 202, CSE 305	4
• CSE 473: Computer Vision	CSE 113, MTH 142	4
• CSE 474: Machine Learning	EAS 305 or STA 401	4
• LIN 438: Semantics I	LIN 205	3
• LIN 443 Semantics II	LIN 415 or permission	3
• MTH 309: Introductory Linear Algebra	MTH 142 or MTH 192 or CSE 192	4
• MTH 313: Elements of Set Theory	MTH 241	4
• MTH 314: Logic for Computer Science	previous math and programming	3
• MTH 413: Mathematical Logic I	MTH 313	3
• MTH 414: Mathematical Logic II	MTH 314 or MTH 413	3
• MTH 419: Introduction to Algebra I	MTH 309	4
• MTH 455: Mathematical Modeling	MTH 242 or MTH 306, 309	3
• MTH 460: Theory of Games	MTH 419, MTH 431	3
• PHI 415: Logical Theory I	PHI 315	3
• PHI 416: Logical Theory II		3
• PHI 417: Modal Logic		3
• PSY 246: Sensory Processes and Perception		3

#3: High Level Mental Processes

This focus area focuses on cognition as a distinct level of description apart from physiological implementation. As such it deals with abstract principles of thought.

Course and Title	Prerequisites	Credits
• APY 245: Survey of Primates		3
• APY 246: Primate Behavior		3
• APY 276: Ethnomedicene		3
• APY 320: Cognitive Anthropology		3
• APY 344: Animal Communication		3
• APY 377: Magic, Sorcery and Witchcraft		3
• APY 380: Myth, Ritual and Symbolism		3
• CSE 202: Programming in Lisp	CSE 116	1
• CSE 472: Knowledge-Based Artificial Intelligence	CSE 202, CSE 305	4
• CSE 474: Machine Learning	EAS 305 or STA 401	4
• GEO 102: Introduction to Human Geography		3
• GEO 485: Cartography & Visualization	GEO 120 or GEO 381	3
• LIN 356: Metaphor		3
• LIN 404: Discourse-Pragmatics	LIN 301, 302; or permission	3
• LIN 413: Language and Cognition	LIN 205, 207; or permission	3
• LIN 417: Psycholinguistics	LIN 205, 207; or permission	3
• LIN 481: Cognitive Foundations of Language		3
• PHI 315: Symbolic Logic		3
• PHI 329: Metaphysics		3
• PHI 333: Epistemology		3
• PHI 345: Aesthetics and Philosophy of Art		3
• PHI 370: Early Modern Philosophy		3
• PHI 386: Dialogue and Interpretation		3
• PSY 345: Memory		3
• PSY 346: Animal Cognition		3
• PSY 348: Psycholinguistics		3
• PSY 357: Cognitive Development		3
• PSY 416: Reasoning and Problem Solving		3

#4: Language

Language is a unique characteristic of human thought. This focus area allows the in-depth exploration of language phenomena at the elementary physiological level through its abstract characterization.

Course and Title	Prerequisites	Credits
• APY 344: Animal Communication		3
• CDS 286: Phonetics		3
• CDS 301: Language Development in Children		3
• CSE 202: Programming in Lisp	CSE 116	1
• CSE 396: Theory of Computation	CSE 192 OR MTH 192 AND CSE 250	4
• CSE 472: Knowledge-Based Artificial Intelligence	CSE 202, CSE 305	4
• LIN 301: Structure of English: Sound System	LIN 205	3
• LIN 302: Structure of English: Grammar and Lexicon	LIN 205	3
• LIN 320: Language and the Brain		3
• LIN 355: Child Language Development		3
• LIN 356: Metaphor		3
• LIN 404: Discourse Pragmatics	LIN 301,302; or permission	3
• LIN 405: Bilingualism and Language Contact	LIN 205	3
• LIN 410: Morphology	LIN 415, LIN 432	3
• LIN 413: Language and Cognition	LIN 205, 207; or permission	3
• LIN 415: Syntax I	LIN 205	3
• LIN 417: Psycholinguistics	LIN 205, 207; or permission	3
• LIN 425: Typology and Universals	LIN 302 or 415	3
• LIN 431: Phonetics	LIN 205	3
• LIN 432: Phonology I	LIN 205	3
• LIN 433: Phonology II	LIN 432	3
• LIN 434: Syntax II	LIN 415	3
• LIN 438: Semantics	LIN 205	3
• LIN 439: Historical Linguistics	LIN 432	3
• LIN 443 Semantics II	LIN 415 or permission	3
• LIN 448: Formal Semantics	LIN 415	3
• LIN 455: Language Acquisition	LIN 301, 302 or 415,432	3
• LIN 481: Cognitive Foundations of Language		3
• PHI 315: Symbolic Logic		3
• PHI 386: Dialogue and Interpretation		3
• PHI 415: Logical Theory I		3
• PHI 416: Logical Theory II	PHI 315	3
• PHI 417: Modal Logic		3
• PSY 322: Language Development		3
• PSY 345: Memory		3
• PSY 348: Psycholinguistics		3

#5: Neurosciences

Human beings are the best examples of thinking machines that we have; thus studying the roots of cognition at the neuroscience level is a valuable approach. This focus area allows students to concentrate on the hardware and how it is used to implement human thought.

Course and Title	Prerequisites	Credits
• APY 457: Evolutionary Biology of Humans		3
• CDS 383: Anatomy and Physiology of the Auditory System	CDS 282, CDS 287	3
• CDS 428: Neural Basis of Communication	permission	3
• CDS 428: Neural Basis of Communication Lab	permission	1
• CSE 474: Machine Learning	EAS 305 or STA 401	4
• LIN 320: Language and the Brain		3
• PGY 424: Developmental Neurobiology	permission	3
• PGY 427: Neurophysiology	PGY 451, PGY 452	4
• PGY 451: Human Physiology I	permission	3
• PGY 452: Human Physiology II	permission	3
• PSY 230: Biopsychology	PSY 101	3
• PSY 246: Sensory Processes and Perception	PSY 101	3
• PSY 318: Biological Bases of Mental Disorders		3
• PSY 324: Psychophysiology		3
• PSY 351: Drug Addiction		3
• PSY 418: Behavioral Medicine		3
• PSY 419: Biological Bases of Memory		3
• PSY 436: Neuropsychology		3
• PSY 439: Biopsychology of Stress		3

#6: Symbolic Systems

This focus area is designed to allow a student to specialize in or focus on the use of symbolic information systems across a wide range of disciplines. Traditional information processing approaches are primary.

Course and Title	Prerequisites	Credits
• CSE 202: Programming in Lisp	CSE 116	1
• CSE 305: Programming Languages	CSE 191, CSE 250	4
• CSE 396: Theory of Computation	CSE 192 or MTH 192 AND CSE 250	4
• CSE 451: Program Development	CSE 305	4
• CSE 472: Knowledge-Based Artificial Intelligence	CSE 202, CSE 305	4
• CSE 473: Computer Vision	CSE 113, MTH 142	4
• CSE 474: Machine Learning	EAS 305 or STA 401	4
• GEO 120: Maps and Mapping		3
• GEO 381: Cartography	GEO 120	3
• GEO 389: Geographic Information Systems		4
• GEO 481: Geographic Information Systems		4
• GEO 485: Cartography and Geographic Visualization	GEO 120 or GEO 381	4
• GEO 488: GIS Design	GEO 481	4
• GEO 489: GIS Algorithms and Data Structures		3
• LIN 302: Structure of English: Grammar and Lexicon	LIN 205	3
• LIN 415: Syntax I	LIN 205	3
• LIN 434: Syntax II	LIN 415	3
• LIN 438: Semantics	LIN 205	3
• LIN 443: Semantics II	LIN 415 or permission	3
• LIN 448: Formal Semantics	LIN 415 or LIN 443	3
• MTH 309: Introductory Linear Algebra	MTH 142 or MTH 192 or CSE 192	4
• MTH 313: Elements of Set Theory	MTH 241	4
• MTH 314: Logic for Computer Science	previous math and programming	3
• MTH 413: Mathematical Logic I	MTH 313	3
• MTH 414: Mathematical Logic II	MTH 314 or MTH 413	3
• MTH 419: Introduction to Algebra I	MTH 309	4
• MTH 455: Mathematical Modeling	MTH 242 OR MTH 306, MTH 309	3
• MTH 460: Theory of Games	MTH 419, MTH 431	3
• PHI 315: Symbolic Logic		3
• PHI 415: Logical Theory I		3
• PHI 416: Logical Theory II	PHI 315	3
• PHI 417: Modal Logic		3
• PSY 345: Memory		3
• PSY 405: Data Analysis Techniques		3
• PSY 416: Reasoning and Problem Solving		3

