

[Child Learning and Development \(B.S.\)](#)
[Cognitive Science \(B.S.\)](#)
[Neuroscience \(B.S.\)](#)
[Psychology](#)
[Speech-Language Pathology and Audiology](#)

School of Behavioral and Brain Sciences Cognitive Science (B.S.)

Cognitive science is the study of complex information processing in humans and machines and includes the multidisciplinary study of biological and artificial systems. Important components of cognitive science include areas of research such as: cognitive-neuroscience, brain-imaging studies of cognitive and perceptual processing, situated cognition, human-computer interactions, computational modeling, and artificial intelligence. The field of cognitive science draws from diverse approaches to understanding these processes, including research from experimental cognitive psychology, experimental social and personality psychology, neuroscience, linguistics, computer science, mathematics, and engineering. The Cognitive Science program at UTD consists of three specialization areas: (1) Psychology/Human-Computer-Interactions, (2) Neuroscience, and (3) Computational Modeling. Cognitive Science Majors then select the majority of their upper-division coursework from 2 of these 3 specialization areas in order to generate multidisciplinary areas of focus such as: "cognitive-neuroscience", "neuropsychology", "computational neuroscience", "human-computers-interaction", "bionics", and "artificial intelligence". In addition to providing a sound preparation for graduate work in Cognitive Science and related areas, the Cognitive Science major is an ideal choice for students pursuing careers that combine interests in neuroscience, cognition, mathematics, and computer science. There are exciting career prospects in both industry and academics. For example, students whose focus area is cognitive-neuroscience will be well-prepared for careers such as: the evaluation of bionic and prosthetic technology (e.g., cochlear implants and artificial limbs), pursuing career paths in neuropharmacological related fields, intraoperative neurophysiological monitoring, brain-imaging technology areas, and clinical neuropsychological settings. Students whose focus area is human-computer-interactions (also known as usability engineering) will be prepared for pursuing careers involving the evaluation and design of user-friendly software interfaces which arise, for example, in the area of website development. Students whose focus area is artificial intelligence and computational models of brain and behavior will acquire a specialized background in mathematical modeling, computer programming, psychology, and neuroscience which can prepare students for careers associated with the development and implementation of intelligent systems (e.g., web search engine design, speech recognition technology, robotics, computer vision, and computer games) as well as bionic and prosthetic technology development and evaluation (such as cochlear implant technology).

Bachelor of Science in Cognitive Science Degree Requirements (120 hours)

I. Core Curriculum Requirements¹: 42 hours

A. Communication (6 hours)

3 hours Communication (RHET 1302)

3 hours Communication Elective (CGS 3340 or PSY 3393)²

B. Social and Behavioral Sciences (15 hours)

6 hours Government (GOVT 2301 and 2302)

6 hours American History

3 hours Social and Behavioral Science Elective (PSY 2301)²

C. Humanities and Fine Arts (6 hours)

3 hours Fine Arts (ARTS 1301)

3 hours Humanities (HUMA 1301)

D. Mathematics and Quantitative Reasoning (6 hours)

6 hours Calculus (MATH 2417 and 2419)³

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E. Science (9 hours)

6 hours Science (NSC 3361 and CGS 2301)²

3 hours Science Electives (including at least one course with a substantial laboratory component)

¹Â Curriculum Requirements can be fulfilled by other approved courses from accredited institutions of higher education. The courses listed in parentheses are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.

II. Required Lower-Division Cognitive Science Major Preparatory Coursework (18 hours)

A. Lower-Division Coursework required by all Cognitive Science Majors

CGS 2301 Cognitive Science² (also satisfies 3 hours part E of Core Curriculum)

CS 1337 Computer Science I

MATH 2417 Calculus I³ (also satisfies 3 hours part D of Core Curriculum)

MATH 2419 Calculus II³ (also satisfies 3 hours part D of Core Curriculum)

PSY 2301 Introduction to Psychology² (also satisfies 3 hours part B of Core Curriculum)

PSY 2317 Statistics for Psychology

or CS/SE/EE 3341 Probability and Statistics in Computer Science and Software Engineering

(prerequisites: MATH 2419, CS 2305)

or STAT 4351 Probability (MATH 2451)

B. Additional Lower-Division Coursework required for Cognitive Science Majors who have

chosen the Computational Modeling Specialization Area

The following courses are only required for Cognitive Science Majors who intend to choose "Computational Modeling"

as one of their desired specialization areas. These courses are prerequisites for many of the upper-division courses

in the Cognitive Science Specialization Area.

CS 2305 Discrete Mathematics for Computing I (prerequisite: MATH 2417)

CS 2336 Computer Science II (prerequisite: CS1337)

MATH 2451 Multivariable Calculus with Applications (prerequisite: MATH 2419)

MATH 2418 Linear Algebra (prerequisite: MATH 2419)

III. Required Major Upper-Division Core Courses: 12 hours

CGS 3361 Cognitive Psychology (prerequisite: CGS 2301)

NSC 3361 Behavioral Neuroscience² (also satisfies 3 hours part E of Core Curriculum)

PSY 3392 Research Design and Analysis

CGS 3340 Empirical Methods in Cognitive Science² (also satisfies 3 hours part A of Core Curriculum)

or PSY 3393 Experimental Projects in Psychology² (also satisfies 3 hours part A of Core Curriculum)

IV. Required Multidisciplinary Specialization Area Course Requirement (24 upper-division hours)

Each Cognitive Science Major must select at least 4 courses from 2 of the following specialization areas to fulfill the multidisciplinary specialization area course requirement. For example, a student interested in fields such as: "cognitive-neuroscience", "brain-imaging", "intraoperative neurophysiological monitoring" should select the specialization areas "Psychology/Human-Computer-Interactions" and "Neuroscience". A student interested in the field of "computational-neuroscience" should select the specialization areas "Neuroscience" and "Computational Modeling". A student interested in "cognitive modeling" should select the specialization areas "Psychology/Human-Computer-Interactions" and "Computational Modeling". A student interested in the field of "human-computer-interactions" should take at least one human-computer-interaction course (CGS4351 Human Computer Interactions I, CGS4353 Human Computer Interactions II, and/or CGS4354 Human Computer Interactions Lab) within the specialization area "Psychology/Human-Computer-Interactions" and choose either the "Neuroscience" or "Computational Modeling" specialization areas depending upon their background and interests. A student interested in the field of "artificial intelligence" should select the

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specialization area of "Computational Modeling" and one of the other two specialization areas to complete the multidisciplinary specialization area course requirement.

A. Neuroscience Specialization Area (12 upper-division hours)

Select 4 of the following.

NSC 4352 Cellular Neuroscience (prerequisite: NSC 3361)
NSC 4354 Integrative Neuroscience (prerequisite: NSC 3361)
NSC 4356 Neurophysiology (prerequisite: NSC 3361)
NSC 4366 Neuroanatomy (prerequisite: NSC 3361)
NSC 4363 Neuropharmacology (prerequisite: NSC 3361)
NSC 4367 Developmental Neurobiology (prerequisite: NSC 3361)
NSC 4353 Neuroscience Laboratory Methods² (also satisfies 3 hours part A of Core Curriculum)

B. Psychology/Human-Computer-Interactions Specialization Area (12 upper-division hours)

Select 4 of the following.

CGS 3325 Historical Perspectives: Mind and Machines Since 1600
CGS 4359 Cognitive Neuroscience
CGS 4362 Perception

CGS 4352 Human Computer Interactions I
CGS 4353 Human Computer Interactions II
CGS 4354 Human Computer Interactions Lab
CGS XXXX Human Judgment and Decision Making

CGS 3331 Social Psychology
CGS 4343 Abnormal Psychology
CGS 4334 Lifespan Development
CGS 3310 Child Development
CGS 3362 Cognitive Development

C. Computational Modeling Specialization (12 upper-division hours)

Select 4 of the following.

CGS 3342 Cognitive and Neural Modeling Lab
CGS 4312 Computational Models of Language Understanding

CGS 4313 Neural Net Mathematics (prerequisites: (MATH 2451 and MATH 2418) or consent of instructor;

STAT 4351 is highly recommended as a corequisite or prerequisite)

CGS 4314 Intelligent Systems Analysis (prerequisite: CGS 4313 or consent of instructor)

CGS 4315 Intelligent Systems Design (prerequisite: CGS 4314 or consent of instructor)

CS 3305 Discrete Mathematics for Computing II (prerequisite: CS2305)

CS 3345 Data Structures and Introduction to Algorithmic Analysis (prerequisites: CS 2336, CS 3305)

CS 4365 Artificial Intelligence (prerequisites: CS2336, CS 3345)

CS 4375 Introduction to Machine Learning (prerequisites: CS2336, CS 3345)

CS 4391 Introduction to Computer Vision (prerequisites: CS2336, CS 3345)

² A required Major course that also fulfills a Core Curriculum requirements

³ Six hours of Calculus are counted to fulfill the Mathematics Core Requirement

V. Free Electives (24 hours)

A. Upper-Division Free Elective Requirement (15 upper-division hours). Cognitive Science Majors are required to take 15 hours of upper-division coursework. This upper-division coursework may include additional upper-division coursework in their chosen

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specialization areas, additional upper-division coursework in the specialization area which they have not chosen, or additional upper-division coursework in other areas of interest to the student.

B. Additional Free Electives Requirement (9 hours of some combination of upper-division and lower-division coursework). In addition to the 15 hours of upper-division coursework, Cognitive Science Majors are required to take 9 additional hours of either lower-division or upper-division coursework. These additional free electives can be used to take courses in other areas of interest to the student or they may be used to fulfill required lower-division course requirements for Cognitive Science Majors who have chosen the Computational Modeling Specialization Area.

Additional Advanced Major Related CGS Electives

All School of Behavioral and Brain Science courses with a PSY (Psychology) or NSC (Neuroscience) prefix are approved CGS electives. In addition, advanced CGS students in good academic standing may request permission from the Cognitive Science Program Head to take graduate Applied Cognition and Neuroscience coursework (ACN prefix) to fulfill the CGS elective course requirements.

In addition, the following advanced electives are associated with all specialization areas. Approval from a Cognitive Science Faculty Advisor is required in order to take these electives.

CGS 4V90 Special Topics in Cognitive Science
CGS 4394 Internship in Cognitive Science
CGS 4397 Honors Thesis
CGS 4V98 Directed Research
CGS 4V99 Individual Study

Minor in Cognitive Science

Students who are not majoring in Cognitive Science may complete the minor in Cognitive Science by completing 18 semester credit hours. In particular, the Cognitive Science Minor is required to select 3 of the 4 Required Upper-Division Cognitive Science Major Core Courses, 1 upper-division Cognitive Science course with the CGS prefix, and 2 additional lower-division or upper-division courses which have been classified as Cognitive Science Major Preparatory Lower-Division Courses or which satisfy the Cognitive Science Multidisciplinary Specialization Area Requirement. No credit hours may be used to satisfy both major and minor requirements; however, free elective hours or major preparatory classes may be used to satisfy the minor. At least one-third of the hours for a minor must be taken at UT Dallas.

Fast Track Baccalaureate/Master's Degrees

UT Dallas undergraduate students with strong academic records who intend to pursue a master's degree in Applied Cognition and Neuroscience at UTD may consider an accelerated undergraduate-graduate plan of study. When accepted into the program, students may take up to 12 hours of graduate courses that may be used to complete the bachelor's degree and also to satisfy requirements for the Master's degree. Students must maintain a 3.00 grade point average and earn grades of B or better in the graduate courses taken. The Fast Track makes it possible for students to complete upper-division undergraduate education and graduate training in three years. To qualify for application, students must have completed at least 72 semester credit hours toward their bachelor degree, including at least 18 semester credit hours in major core courses at UTD. Apply to the Fast Track program through the Cognitive Science Program Office. Students should consult with a graduate advisor regarding admissions criteria and plans of study at the beginning of their junior year.

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