

# COGNITIVE SCIENCE

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Cognitive science explores the nature of cognitive processes such as perception, reasoning, memory, attention, language, decision making, imagery, motor control, and problem solving. The goal of cognitive science, stated simply, is to understand how the mind works. Cognitive science is an inherently interdisciplinary endeavor, drawing on tools and ideas from fields such as psychology, computer science, linguistics, philosophy, economics, and neuroscience. Approaches include empirical studies of the ontogenetic and phylogenetic development of cognitive abilities, experimental work on cognitive processing in adults, attempts to understand perception and cognition based on patterns of breakdown in pathology, computational and robotic research that strives to simulate aspects of cognition and behavior, neuroscientific investigations of the neural bases of cognition using neural recording and brain scanning, and the development of philosophical theories of the nature of mind.

## PREREQUISITE

An introductory survey course, CGSC 110, is normally taken by the end of the fall term of the sophomore year and prior to admission to the major.

## REQUIREMENTS OF THE MAJOR

The requirements of the major for the B.S. and B.A. degrees are the same, except for the skills requirement and the senior requirement. Fourteen term courses, for a total of thirteen and one half course credits, are required for the major, including the introductory course and the senior requirement. Each major program must include the elements described below. The particular selection of courses must be approved by the director of undergraduate studies (DUS) in order to assure overall coherence. No course may be used to fulfill more than one requirement for the major.

**Breadth requirement** A breadth requirement introduces students to the subfields of cognitive science. Each major is required to take a course from four of the following six areas:

1. Computer science: CPSC 201
2. Economics and decision making: ECON 159
3. Linguistics: LING 110, 116, 130, 217, 232, 253
4. Neuroscience: CGSC 201, MCDB 320, NSCI 340, PSYC 160, 270
5. Philosophy: PHIL 126, 182, 269, 270, 271
6. Psychology: PSYC 110, S139E, 140

**Depth requirement** Students fulfill a depth requirement by completing six courses that focus on a specific topic or area in cognitive science. The depth courses must be chosen from at least two disciplines, and are typically drawn from the six cognitive science subfields. It may be possible to draw depth courses from other fields when necessary to explore the student's focal topic, in consultation with the DUS. All six depth courses

must be at the intermediate or advanced level; for most disciplines, courses numbered 300 or above fulfill the requirement. With permission of the DUS, up to two directed reading or research courses may count toward the depth requirement.

**Skills requirement** Because formal techniques are fundamental to cognitive science, one skills course is required, preferably prior to the senior year. Courses that fulfill the skills requirement for the B.A. include CPSC 112, 202, LING 224, PSYC 200, and 270, and S&DS 100, 220 and 230. Other courses may fulfill this requirement with permission of the DUS. The skills requirement for the B.S. is fulfilled by PSYC 200 or another course with permission of the DUS.

**Junior colloquium** In the junior year, students are required to take CGSC 395, a half-credit colloquium in which majors discuss current issues and research in cognitive science and select a senior essay topic.

**Repeat for credit** Only one term of CGSC 471, 472, 473, or 474 may be offered toward the major.

**Credit/D/Fail** Courses taken Credit/D/Fail may not be counted toward the requirements of the major, except with permission of the DUS.

#### SENIOR REQUIREMENT

In the senior year, students take CGSC 491, a full-credit capstone course in which the senior essay is written. Students in the course meet regularly with one another and with the faculty to discuss current work in cognitive science and their own developing research projects. Students must take this course during their last spring term at Yale. If spring is not the student's final term, (e.g., a planned December graduation date), then it is possible to attend the class and complete some of the assignments, but not turn in the finished thesis until November. In this case, a grade of INC will be given for the Spring term. (Unlike other incomplete grades at Yale, an incomplete for a thesis does not expire.)

**B.S. degree program** The B.S. degree is typically awarded to students who conduct empirical research as part of their senior requirement. This normally includes designing an experiment and collecting and analyzing data.

**B.A. degree program** The B.A. degree is typically awarded to students who conduct a nonempirical senior essay. There are no restrictions on the research format for the B.A.

#### ADVISING AND APPLICATION TO THE MAJOR

Students may apply to enter the major at any point after the first year. Applications must be made in writing to the DUS. Applications must include (1) an official or unofficial transcript of work at Yale, (2) a brief statement of purpose, which indicates academic interests and expected focus within the areas of the Cognitive Science major, and (3) a list of the six upper-level courses that the student plans to take as part of the research focus. Application forms and answers to frequently asked questions are available on the program website.

#### SUMMARY OF MAJOR REQUIREMENTS

**Prerequisite** CGSC 110

**Number of courses** 14 term courses, for a total of 13,5 course credits (incl prereq and senior req)

**Specific course required** CGSC 395

**Distribution of courses** 1 course each in 4 of 6 subfields, as specified for breadth req; 6 courses in a specific topic or area, as specified for depth req; 1 skills course, as specified

**Senior requirement** *B.S.* – empirical research and senior essay in CGSC 491; *B.A.* – nonempirical senior essay in CGSC 491