Cognitive Science

The Designated Emphasis (DE) in Cognitive Science trains student in the breadth of interdisciplinary approaches to the science of the mind as well as in computational thinking. Cognitive Science is characterized by a focus on classic foundational questions about the mind, for example: What aspects of knowledge are innate? What aspects of thought are uniquely human? Is human thought rational? And it pursues these unifying core questions through methods drawn from a variety of disciplines, most commonly psychology, linguistics, computer science, neuroscience, anthropology, and philosophy.

Within this overall picture, there is one aspect of cognitive science that is theoretically central: computation. Computation serves both as a model of the mind, and as a set of precise tools for investigating it. Cognitive science thus represents an engagement with fundamental questions of the mind that is computationally oriented but is focused on human rather than artificial intelligence. In today's environment, cognitive science has the potential to prepare students and citizens for a world in which the intersection of minds, machines, data, and inference is increasingly important, yet in which the centrality of the human mind to that intersection is sometimes obscured, or treated only superficially. Computational principles also serve as a shared lingua franca that allows psychologists, linguists, anthropologists, neuroscientists, and others to communicate with each other.

PhD students in any department may apply. All applications must be reviewed and approved by the Executive Committee of the Graduate Group. To apply, students must submit a form listing their prior preparation in the field and their projected pathway through the program, along with a (maximum) on-page essay stating their interest and reasoning for applying. A CV and a letter of recommendation from a faculty member in the student's home department indicating how and why the student would benefit from the DE. Students must be admitted to the DE prior to taking the Qualifying Exam.

Admission will be determined by the members of the Executive Committee on the basis of the student's background and preparation, and of how well the student has articulated the value of the DE for their larger course of study and career goals.

DE students will be required to take three courses: one to fulfill a computational requirement, and two to fulfill a breadth requirement. Courses that fulfill these requirements are listed below. Students may petition the DE Executive Committee to have other classes added to these lists. Students will have to meet the prerequisites for the specific classes they wish to take. In addition, although it is not an official requirement, DE students will be encouraged to regularly attend and participate in the ICBS (https://icbs.berkeley.edu/) colloquia.

Computational Cognitive Science

DE students should take one course in computational cognitive science. There are several options for fulfilling this requirement:

COG SCI 131	Computational Models of Cognition	4
COMPSCI 188	Introduction to Artificial Intelligence	4
COMPSCI C280	Computer Vision	3
COMPSCI C281A	Statistical Learning Theory	3
COMPSCI C281B	Advanced Topics in Learning and Decision Making	3
COMPSCI 282A	Designing, Visualizing and Understanding Deep Neural Networks	4
COMPSCI 285	Deep Reinforcement Learning, Decision Making, and Control	3
COMPSCI 287	Advanced Robotics	3
COMPSCI 287H	Algorithmic Human-Robot Interaction	4
COMPSCI 288	Natural Language Processing	4
COMPSCI 289A	Introduction to Machine Learning	4
EDUC 244	Data Mining and Analytics	3
EL ENG 225D	Audio Signal Processing in Humans and Machines	3
LINGUIS 243	Language, Computation, and Cognition	3
LINGUIS 252	COMPUTATIONAL LINGUISTICS	3
PSYCH 208	Methods in Computational Modeling for Cognitive Science	3
VIS SCI 265	Neural Computation	3

Breadth

DE students should take two cognitive-science-relevant courses each of which is in a department or program other than their own, and other than the department or program offering the course that the student chose to fulfill the computational requirement. The breadth courses need not be primarily computational in focus, but they may be. The courses may be drawn from the computational bin shown above, or from the following additional courses:

ANTHRO 107	Evolution of the Human Brain	4
EDUC 203	Cultivating Cognitive Development: From Sensorimotor Intelligence to Embodied STEM Concepts	3
LINGUIS 205	Advanced Cognitive Linguistics	3
LINGUIS 208	Advanced Psycholinguistics	3
LINGUIS 210	Advanced Phonetics	3
PSYCH 240A	Proseminar: Biological, Cognitive, and Language Development	3