Cognitive Sciences, Ph.D.

The Department of Cognitive Sciences offers a Ph.D. program in cognitive sciences to prepare students for research and teaching careers in academia, industry, and government. The department is regarded as one of the world's leading centers for mathematically oriented research in cognitive sciences. The Ph.D. program places particular emphasis on modern and leading-edge techniques of experimental and theoretical research into the function of the human mind and brain. Special attention is given to providing hands-on research experience and equipping students with sophisticated mathematical and computing skills. There are three tracks within the program: Cognitive Sciences, Cognitive Neuroscience, and Statistics, identified by a distinct Master's degree earned within the program.

The department faculty, which includes two members of the National Academy of Sciences, has many who serve as editors or editorial board members of leading professional journals, board members of international professional societies, and as members of study panels at the National Science Foundation and the National Institutes of Health. Cognitive Sciences faculty members have joint appointments and research collaborations with other departments including Biomedical Engineering, Logic and Philosophy of Science, Computer Science, Neurobiology and Behavior, and Statistics. Many Cognitive Sciences faculty are also members of research units at UCI such as the Data Science Institute, the Facility for Imaging and Brain Research (FIBRE), the Center for Hearing Research, and the Center for Neurobiology of Learning and Memory.

In addition to meeting the general requirements for admission, applicants should have acquired a background in mathematics equivalent to at least one year of calculus, and preferably courses such as linear algebra and a programming language. Suitable undergraduate degrees for our program include degrees in psychology, cognitive science, biology, computer science, mathematics, statistics, engineering, physical sciences, linguistics, philosophy, or related fields. Standard requirements for admission include Graduate Record Examination (GRE) scores for tests taken within the past five years, official transcripts of all college course work, and at least three letters of recommendation. Applicants whose primary language is not English are required to demonstrate proficiency in English for admission consideration. Information about this requirement is available at https://grad.uci.edu/admissions/applying-to-uci/.

To receive full consideration for fellowship and assistantship awards, applications must be received by December 1. Admissions decisions are made by the end of March. Applicants whose primary language is not English should note that the English language proficiency requirements for financial support are higher than the requirements for admission. Further information and application materials are available online at the Graduate Division website (http://www.grad.uci.edu/.html).

Although the Department does not have a terminal master's program, students may earn an optional master's degree as part of the Ph.D. program. Students in the Ph.D. program in Cognitive Sciences may earn an M.S. in Cognitive Sciences. Students in the concentration may earn an M.S. in Cognitive Neuroscience.

All students who have started in our Ph.D. program have the opportunity to apply for an M.S. in Statistics through a joint M.S./Ph.D. program offered with the Department of Statistics. Students who are admitted to this joint program are not eligible for the M.S. degrees in Cognitive Sciences and Cognitive Neuroscience.

Requirements for the M.S. in Cognitive Sciences and M.S. in Cognitive Neuroscience

Students enrolled in the program may earn an M.S. in Cognitive Sciences or M.S. in Cognitive Neuroscience by completing the following requirements. The student must: 1) complete the required course work; and 2) pass the Second-Year Examination.

Second-Year Examination

During the first year, in consultation with their advisor, the student should establish an advisory committee consisting of three faculty members, one of whom should be the primary advisor. At least two of the three must be Cognitive Sciences faculty members. The committee should meet with the student no later than spring quarter of the first year to determine the student’s area(s) of research interest and to identify the published literature with which the student must be familiar. At the beginning of the fall quarter of their second year, students will be required to take a second-year examination. It will involve (1) the student writing a critical review of work in their area of research interest, and (2) a presentation by the student followed by an oral examination by the committee. Should the student fail the second-year exam, the student will be allowed to repeat the exam in the winter quarter. A subsequent failure results in the student exiting the program.

Pre-Advancement Talk

Prior to advancement, usually in the third year, each student is required to give a talk to the department faculty and students. Each student is expected to carry out theoretical/empirical research during the first two years. By the start of the third year, each student should have completed a research project of a scope and nature that is potentially publishable in a professional journal. This talk is required prior to the student’s advancement to candidacy.

Advancement Examination

The advancement examination consists of a written research proposal, for example in NIH NRSA Predoctoral Fellowship format, and an oral defense of the proposed research. The requirements for advancement are detailed below. Normative time for students to advance to candidacy is by the end of their fourth year in the program.

Dissertation

Students must submit a dissertation describing original publishable research and present a public defense of the dissertation as the final requirement of the Ph.D. program as detailed below.

Requirements for Advancement to Candidacy

The requirements for advancement to candidacy are (1) the student must meet the requirements listed for the appropriate Master's degree; and (2) the student must, in addition, form a five-member faculty committee selected according to Graduate Division policy. The committee will examine the student on a topic which is determined in consultation with the committee. A written document describing the student's work on this topic must be submitted to the committee prior to advancement. The student must demonstrate an understanding of the background and issues for the research topic and show sufficient preparation and creativity to undertake planning for a dissertation project (e.g., by describing a possible experimental design or outlining a possible theoretical development).

Requirements for the Ph.D.

The requirements for the Ph.D. degree are (1) the student must formally present and defend a written dissertation proposal to a committee of at least three members selected according to Graduate Division requirements. The dissertation proposal presentation may take place as part of the examination for Advancement to Candidacy, in which case, that five-member committee will approve the dissertation proposal; (2) the proposal must be approved prior to the final dissertation defense (usually at least three months before to allow time for the candidate to incorporate suggestions and changes required by the committee); (3) the accepted proposal must be archived with the department; (4) prior to the approval of the final version of the dissertation the student is expected to defend the dissertation in a public colloquium announced with at least two weeks' notice; and (5) all requirements for the Ph.D. degree must be fulfilled within three years after advancement to candidacy.

The normative time for advancement to candidacy is four years. The normative time for completion of the Ph.D. is five years, and the maximum time permitted is six years.

A. Select two cognitive and brain sciences core courses:	
COGS 210A	Cognitive and Brain Sciences I: Topics in Perception
COGS 210B	Cognitive and Brain Sciences II: Topics in Cognition
COGS 210C	Cognitive and Brain Sciences III: Topics in Learning and Development
B. Select three quantitative courses:	
COGS 203A	Statistical Models for Cognitive Sciences I
COGS 203B	Statistical Models for Cognitive Sciences II
COGS 203C	Statistical Models for Cognitive Sciences III
COGS 203D	Applied Mathematics for Cognitive Sciences
COGS 214	Bayesian Cognitive Modeling
STATS 210	Statistical Methods I: Linear Models
C. Select two computational methods courses:	
COGS 205B	Computational Lab Skills for Cognitive Scientists I
COGS 205C	Introduction to Statistical Learning
COGS 205D	Neural Networks and Machine Learning
COGS 214	Bayesian Cognitive Modeling
D. Complete five electives of which at least two must be taken in Cognitive Sciences. Exceptions to this rule must be approved by the Graduate Director.	

Many of these courses require familiarity with computer programming, which an be obtained by taking COGS 205A. Students are expected to enroll in the Cognitive Sciences Research Seminar COGS 201A-COGS 201B-COGS 201C during all quarters in residence prior to passage of the advancement-to-candidacy examination. During the fall of the first year in the program, students must enroll in COGS 202A. Note that no course may be used to fulfill more than one requirement in the program.

Ph.D. in Cognitive Sciences with a Concentration in Cognitive Neuroscience

A. Select two cognitive and brain sciences core courses:	
COGS 210A	Cognitive and Brain Sciences I: Topics in Perception
COGS 210B	Cognitive and Brain Sciences II: Topics in Cognition
COGS 210C	Cognitive and Brain Sciences III: Topics in Learning and Development
B. Select two quantitative courses:	
COGS 203A	Statistical Models for Cognitive Sciences I
COGS 203B	Statistical Models for Cognitive Sciences II

COGS 203C	Statistical Models for Cognitive Sciences III
COGS 203D	Applied Mathematics for Cognitive Sciences
COGS 214	Bayesian Cognitive Modeling
STATS 210	Statistical Methods I: Linear Models
C. Select one computational methods course:	
COGS 205B	Computational Lab Skills for Cognitive Scientists I
COGS 205C	Introduction to Statistical Learning
COGS 205D	Neural Networks and Machine Learning
COGS 214	Bayesian Cognitive Modeling
D. Complete two neuroscience methods courses:	
COGS 205D	Neural Networks and Machine Learning
COGS 265	Introduction to Functional MRI
COGS 268A	Computational Neuroscience
E. Complete five electives of which at least two must be taken in Cognitive Sciences. Exceptions to this rule must be approved by the Graduate Director.	

Many of these courses require familiarity with computer programming, which can be obtained by taking COGS 205A. Students are expected to enroll in the Cognitive Sciences Research Seminar COGS 201A-COGS 201B-COGS 201C during all quarters in residence prior to passage of the advancement-to-candidacy examination. During the fall of the first year in the program, students must enroll in COGS 202A. Note that no course may be used to fulfill more than one requirement in the program.

Joint M.S. in Statistics and Ph.D. in Cognitive Sciences Program

Current students in the Department of Cognitive Sceinces' Ph.D. program are eligible to apply for the joint program with the Department of Statistics. Ph.D. students interested in pursuing the joint program must notify the Graduate Director and receive approval to enroll in STATS 210 and either STATS 210B or STATS 211, which fulfills the quantitative requirement in the Ph.D. program.

Admissions

In the winter quarter of their first year, interested Ph.D. students must contact the Graduate Director to indicate interest in applying for the joint M.S./ Ph.D. program. The application consists of:

a. A copy of the original application to the Department of Cognitive Sciences' Ph.D. program, including transcripts, GRE scores, and letters of recommendation.
b. A letter from the Cognitive Sciences Department Chair recommending the student for the joint program in Statistics/Cognitive Sciences.
c. A letter of approval from the School of Social Sciences' Associate Dean for Research and Graduate Studies.

The Department of Statistics reviews the application in spring quarter to determine whether the student is adequately prepared for the M.S. in Statistics component.

Upon admission into the joint program, the student is expected to pass a comprehensive exam covering the material in either STATS 210-STATS 211-STATS 212 or STATS 210-STATS 210B-STATS 210C, following the spring quarter. In the fall of the second year, the student enrolls as an M.S. in Statistics student through the Department of Statistics and completes the remaining coursework and comprehensive exam. During this year, the student continues to receive financial support from the School of Social Sciences, as outlined in the original admissions letter.

After successfully completing one year in the Statistics program, the student will enroll in the Cognitive Sciences Ph.D. program in year three, and complete the normal requirements for the Ph.D.

Requirements for the M.S. in Statistics

A. Complete the following:	
STATS 200A- 200B- 200C	Intermediate Probability and Statistical Theory and Intermediate Probability and Statistical Theory and Intermediate Probability and Statistical Theory
STATS 210B	Statistical Methods II: Categorical Data
STATS 210C	Statistical Methods III: Longitudinal Data
STATS 210	Statistical Methods I: Linear Models
STATS 205	Introduction to Bayesian Data Analysis
B. Complete three quarters of STATS 280	
C. Select two elective graduate courses offered by the Department of Statistics [2]	

D. Select three electives from the Ph.D. program in Cognitive Sciences. The three electives must be selected from the following two areas: [3]	
Computational Methods	
COGS 205B	Computational Lab Skills for Cognitive Scientists I
COGS 205C	Introduction to Statistical Learning
COGS 205D	Neural Networks and Machine Learning
COGS 214	Bayesian Cognitive Modeling
COGS 237	Advanced Bayesian Cognitive Modeling
Neuroscience Methods	
COGS 265	Introduction to Functional MRI
COGS 268A	Computational Neuroscience

1 STATS 211 and STATS 212 may be substituted for STATS 210B and STATS 210C.

2 At most, one of the two electives courses may be STATS 299, and only with prior approval from the Department's Graduate Committee.

3 These three courses fulfill requirements for both programs.

The entire program of courses must be approved by the Statistics Department Graduate Committee. Students with previous graduate training in statistics may petition the Committee to substitute other courses for a subset of the required courses. Students are required to pass a written comprehensive examination ordinarily at the end of the first year covering the material in either STATS 210 and STATS 210B-STATS 210C, or STATS 210, STATS 211, and STATS 212. At the end of the second year, the student must pass a written comprehensive examination covering the material from STATS 200A-STATS 200B-STATS 200C. Note that no course may be taken to fulfill more than one requirement within this program.

Requirements for the Ph.D. in Cognitive Sciences

A. Complete two cognitive and brain sciences core courses selected from:	
COGS 210A	Cognitive and Brain Sciences I: Topics in Perception
COGS 210B	Cognitive and Brain Sciences II: Topics in Cognition
COGS 210C	Cognitive and Brain Sciences III: Topics in Learning and Development
B. Select one of the following:	
COGS 205B	Computational Lab Skills for Cognitive Scientists I
COGS 205C	Introduction to Statistical Learning
COGS 214	Bayesian Cognitive Modeling
C. Complete two technical electives from the following:	
COGS 205B	Computational Lab Skills for Cognitive Scientists I
COGS 205C	Introduction to Statistical Learning
COGS 214	Bayesian Cognitive Modeling
COGS 237	Advanced Bayesian Cognitive Modeling
COGS 265	Introduction to Functional MRI
COGS 268A	Computational Neuroscience
D. Complete four electives (at least two from Cognitive Sciences)	

Many of these course require familiarity with computer programming, which can be obtained by taking COGS 205A. Students are expected to enroll in the Cognitive Sciences Research Seminar COGS 201A-COGS 201B-COGS 201C during all quarters in residence prior to passage of the advancement to candidacy examination. During the fall of the first year in the program, students must enroll in COGS 202A. Note that no course may be used to fulfill more than one requirement in the program.