

COGNITIVE SCIENCE (Div II)

Chair: Professor Nate Kornell

- Joseph L. Cruz, Professor of Philosophy; on leave Spring 2022
- Kris N. Kirby, Professor of Psychology; on leave Fall 2021
- Nate Kornell, Professor of Psychology, Chair of Cognitive Science Program; affiliated with: Cognitive Science Program
- Heather Williams, William Dwight Whitney Professor of Biology; affiliated with: Neuroscience Program; on leave Spring 2022
- Safa R. Zaki, Dean of the Faculty, Class of 1924 Professor of Psychology; affiliated with: Psychology Department

Cognitive science is concerned with how humans, non-human animals, and computers acquire, represent, manipulate, and use information. As an interdisciplinary field it combines research and theory from computer science (e.g., artificial intelligence), cognitive psychology, philosophy, linguistics, and neuroscience, and to some extent evolutionary biology, math, and anthropology. Complex issues of cognition are not easily addressed using traditional intra-disciplinary tools. Cognitive researchers in any discipline typically employ a collection of analytic and modeling tools from across traditional disciplinary boundaries. Thus, the methods and research agenda of cognitive science are broader than those of any of the fields that have traditionally contributed to cognitive science. The Cognitive Science Program is designed to provide students with the broad interdisciplinary foundation needed to approach issues of cognition.

THE CONCENTRATION

The concentration in Cognitive Science consists of six courses, including an introductory course, four electives, and a senior seminar.

Minds, Brains, and Intelligent Behavior (COGS 222) is the entry point into the concentration, and provides an interdisciplinary perspective on issues of cognition. Ideally, it should be taken before the end of the sophomore year. Emphasizing the highly interdisciplinary nature of the field, the four electives must be distributed over at least three course prefixes. In the fall of the senior year, concentrators will participate in a senior seminar (COGS 493) or a senior tutorial, depending on enrollments.

Required Courses

COGS/PHIL/PSYC 222 Minds, Brains, and Intelligent Behavior: An Introduction to Cognitive Science

COGS 493 Senior Seminar or Senior Tutorial (In years where 493 is not offered, students should contact the Program Chair for details).

Elective Courses

Four electives are required, chosen from at least three prefixes, at most two of which can be at the 100 level.

[BIOL 204\(S\) LEC Animal Behavior](#)

Taught by: [Manuel Morales](#)

[Catalog details](#)

[COGS 328 / PSYC 328\(S\) SEM Cognitive Approaches to Visual Perception](#)

Taught by: Omer Daglar Tanrikulu

[Catalog details](#)

[CSCI 134\(F, S\) LEC Introduction to Computer Science](#)

Taught by: [Shikha Singh](#), [Jeannie R Albrecht](#), Rohit Bhattacharya

[Catalog details](#)

[CSCI 361 / MATH 361\(F, S\) CON Theory of Computation](#)

Taught by: [Aaron Williams](#)

[Catalog details](#)

[CSCI 373 LEC Artificial Intelligence](#)

Taught by: Jon Park

[Catalog details](#)

[CSCI 374 TUT Machine Learning](#)

Taught by: Andrea Danyluk

[Catalog details](#)

[CSCI 379\(F, S\) LEC Causal Inference](#)

Taught by: Rohit Bhattacharya

[Catalog details](#)

[NSCI 201 / BIOL 212 / PSYC 212\(F\) LEC Neuroscience](#)

Taught by: [Tim Lebestky](#), [Victor Cazares](#)

[Catalog details](#)

[PHIL 216 / ENVI 216 SEM Philosophy of Animals](#)

Taught by: [Joseph Cruz](#)
[Catalog details](#)
[PHIL 388 TUT Consciousness](#)

Taught by: [Joseph Cruz](#)
[Catalog details](#)
[PSYC 221\(F\) LEC Cognitive Psychology](#)

Taught by: TBA
[Catalog details](#)
[PSYC 322 SEM Concepts: Mind, Brain, and Culture](#)

Taught by: TBA
[Catalog details](#)
[PSYC 324 TUT Great Debates in Cognition](#)

Taught by: TBA
[Catalog details](#)
[PSYC 326 SEM Choice and Decision Making](#)

Taught by: [Kris Kirby](#)
[Catalog details](#)
[PSYC 327\(S\) SEM Cognition and Education](#)

Taught by: [Nate Kornell](#)
[Catalog details](#)
[REL 288 / PHIL 288 SEM Embodiment and Consciousness: A Cross-Cultural Exploration](#)

Taught by: [Georges Dreyfus](#)
[Catalog details](#)

Recommended Courses

The following courses are recommended for students seeking a richer background in cognitive science. These will not count as electives for the cognitive science concentration.

[BIOL 305\(S\) LEC Evolution](#)

Taught by: [Luana Maroja](#)
[Catalog details](#)
[ECON 502\(F\) LEC Statistics/Econometrics](#)

Taught by: [Anand Swamy](#)
[Catalog details](#)
[MATH 250\(F, S\) LEC Linear Algebra](#)

Taught by: [Susan Loepp](#), [Allison Pacelli](#)
[Catalog details](#)
[PHIL 209 / STS 209\(S\) SEM Philosophy of Science](#)

Taught by: [Bojana Mladenovic](#)
[Catalog details](#)
[PSYC 201\(F, S\) LEC Experimentation and Statistics](#)

Taught by: [Kenneth Savitsky](#), [Steven Fein](#), [Eliza L Congdon](#), [Kris Kirby](#), [Shivon Robinson](#)
[Catalog details](#)
[STAT 101\(F, S\) LEC Elementary Statistics and Data Analysis](#)

Taught by: [Elizabeth Upton](#), [Annie Tang](#), [Shaoyang Ning](#)
[Catalog details](#)
[STAT 201\(F, S\) LEC Statistics and Data Analysis](#)

Taught by: [Stewart Johnson](#)
[Catalog details](#)

Formal admission to candidacy for honors will occur at the end of the fall semester of the senior year and will be based on promising performance in COGS 493. This program will consist of COGS W31-494(S), and will be supervised by members of the advisory committee from at least two departments. Presentation of a thesis, however, should not be interpreted as a guarantee of a degree with honors.

STUDY ABROAD

Students who wish to discuss plans for study abroad are invited to meet with any member of the Cognitive Science advisory committee.

FAQ

Students MUST contact departments/programs BEFORE assuming study away credit will be granted toward the major or concentration.

Can your department or program typically pre-approve courses for major/concentration credit?

Yes, in many cases, though students should be sure to contact the department.

What criteria will typically be used/required to determine whether a student may receive major/concentration credit for a course taken while on study away?

Complete syllabus and course description, including readings/assignments.

Does your department/program place restrictions on the number of major/concentration credits that a student might earn through study away?

No.

Does your department/program place restrictions on the types of courses that can be awarded credit towards your major?

No. As long as the study abroad courses conform to the interdisciplinary distribution requirements of the concentration.

Are there specific major requirements that cannot be fulfilled while on study away?

No.

Are there specific major requirements in your department/program that students should be particularly aware of when weighing study away options? (Some examples might include a required course that is always taught in one semester, laboratory requirements.)

No.

Give examples in which students thought or assumed that courses taken away would count toward the major or concentration and then learned they wouldn't:

None to date.

COGS 222 (F)(S) Minds, Brains, and Intelligent Behavior: An Introduction to Cognitive Science

Cross-listings: PSYC 222 PHIL 222 COGS 222

Primary Cross-listing

This course will emphasize interdisciplinary approaches to the study of intelligent systems, both natural and artificial. Cognitive science synthesizes research from cognitive psychology, computer science, linguistics, neuroscience, and contemporary philosophy. Special attention will be given to the philosophical foundations of cognitive science, representation and computation in symbolic and connectionist architectures, concept acquisition, problem solving, perception, language, semantics, reasoning, and artificial intelligence.

Requirements/Evaluation: midterm and final exams, and weekly exercises

Prerequisites: PSYC 101 or any PHIL course or CSCI 134 or permission of instructor; background in more than one of these is recommended.

Enrollment Limit: 20

Enrollment Preferences: sophomore and first-year students, with additional preference given to students who satisfy more of the prerequisites.

Expected Class Size: 20

Grading: no pass/fail option, no fifth course option

Unit Notes: meets Contemporary Metaphysics & Epistemology requirement only if registration is under PHIL

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

PSYC 222 (D3) PHIL 222 (D2) COGS 222 (D2)

Attributes: Linguistics PHIL Contemp Metaphysics + Epistemology Courses PSYC 200-level Courses

Fall 2021

LEC Section: 01 MW 7:00 pm - 8:15 pm Joseph L. Cruz

LEC Section: 02 TR 11:20 am - 12:35 pm Omer Daglar Tanrikulu

Spring 2022

LEC Section: 01 TR 11:20 am - 12:35 pm Omer Daglar Tanrikulu

COGS 328 (S) Cognitive Approaches to Visual Perception

Cross-listings: PSYC 328 COGS 328

Primary Cross-listing

When you open your eyes, you immediately perceive your environment in great detail. Seeing is so quick and effortless that people mistakenly think that vision works like a camera. However, the reason it feels effortless is due to the tremendous amount of complex processes and computations that take place in your brain whenever you open your eyes. In this course, we will explore such processes from a computational perspective. How does cognitive psychology approach visual perception? What is the relationship between perception and cognition? How can we experimentally study visual consciousness? In addition to exploring such questions, we will also examine how our visual system processes certain visual features in our environment, such as motion, color, depth and shape.

Requirements/Evaluation: Class participation, weekly take-home quizzes, weekly short commentaries on readings, class presentation, individual 12- to 15-page final paper

Prerequisites: PSYC 221, COGS/PHIL/PSYC 222, or permission of instructor

Enrollment Limit: 19

Enrollment Preferences: Cognitive Science concentrators

Expected Class Size: 19

Grading: yes pass/fail option, yes fifth course option

Distributions: (D2)

This course is cross-listed and the prefixes carry the following divisional credit:

PSYC 328 (D3) COGS 328 (D2)

Attributes: COGS Interdepartmental Electives PSYC Area 2 - Cognitive Psychology

Spring 2022

SEM Section: 01 MWF 8:30 am - 9:45 am Omer Daglar Tanrikulu

COGS 493 (F) Advanced Topics in Mind and Cognition

In the last decade the science of the mind has continued to draw on its 20th century history as well as expand its methodological repertoire. In this seminar we will investigate current trends in mind and cognition by considering research in cognitive neuroscience, embodied cognition, dynamic systems theory, and empirical approaches to consciousness. Throughout, we will attend both to the specific empirical details as well as the conceptual foundations of this work. We will discuss how it elaborates, expands, and sharpens early views of the domain and methodology of philosophy of mind and cognitive science.

Requirements/Evaluation: weekly short essays, seminar presentation, final paper/project

Prerequisites: Senior Cognitive Science concentrator

Enrollment Limit: 12

Enrollment Preferences: Open only to Senior Cognitive Science concentrators

Expected Class Size: 5

Grading: no pass/fail option, no fifth course option

Distributions: (D2)

Fall 2021

SEM Section: 01 W 1:10 pm - 3:50 pm Omer Daglar Tanrikulu

COGS 494 (S) Senior Thesis: Cognitive Science

The senior concentrator, having completed the senior seminar and with approval from the advisory committee, may devote winter study and the spring semester to a senior thesis based on the fall research project.

Requirements/Evaluation: Determined by thesis advisor

Prerequisites: permission of program chair

Enrollment Limit: none

Enrollment Preferences: Senior Cognitive Science concentrators

Expected Class Size: NA

Grading: no pass/fail option, no fifth course option

Distributions: (D2)

Spring 2022

HON Section: 01 TBA Nate Kornell

COGS 497 (F) Independent Study: Cognitive Science

Cognitive Science independent study.

Class Format: This course is coordinated in agreement with a sponsoring Cognitive Science faculty member.

Requirements/Evaluation: Determined by individual instructors

Prerequisites: permission of program chair

Enrollment Limit: none

Enrollment Preferences: Cognitive Science concentrators

Expected Class Size: NA

Grading: yes pass/fail option, yes fifth course option

Distributions: (D2)

Fall 2021

IND Section: 01 TBA Nate Kornell

COGS 498 (S) Independent Study: Cognitive Science

Cognitive Science independent study.

Class Format: This course is coordinated in agreement with a sponsoring Cognitive Science faculty member.

Requirements/Evaluation: Determined by individual instructors

Prerequisites: permission of program chair

Enrollment Limit: none

Enrollment Preferences: Cognitive Science concentrators

Expected Class Size: NA

Grading: yes pass/fail option, yes fifth course option

Distributions: (D2)

Spring 2022

IND Section: 01 TBA Nate Kornell

Winter Study -----

COGS 31 (W) Senior Thesis: Cognitive Science

May be taken by students registered for Cognitive Science 494.

Class Format: independent study

Grading: pass/fail only

Winter 2022

HON Section: 01 TBA Nate Kornell

COGS 99 (W) Ind Study: Cognitive Science

Open to upperclass students. Students interested in doing an independent project (99) during Winter Study must make prior arrangements with a faculty sponsor. The student and professor then complete the independent study proposal form available online. The deadline is typically in late September. Proposals are reviewed by the pertinent department and the Winter Study Committee. Students will be notified if their proposal is approved prior to the Winter Study registration period.

Class Format: independent study

Grading: pass/fail only

Winter 2022

IND Section: 01 TBA Nate Kornell