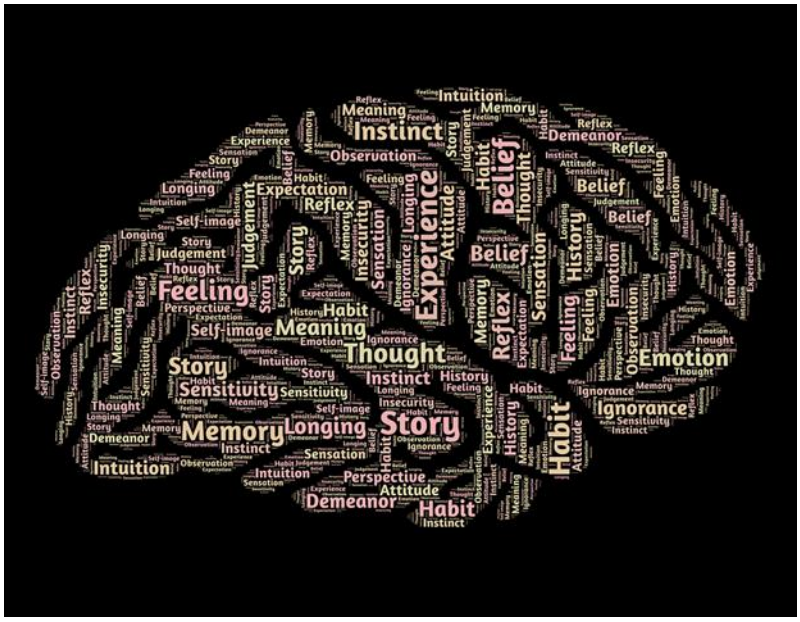
Cognitive Neuroscience

Department of Psychology
Colorado State University

Doctoral Program Brochure

2020-2021 Academic Year



psychology.colostate.edu/cogneuro/

Cognitive Neuroscience Program

The Graduate Program in Cognitive Neuroscience is a competitive doctoral training program in the College of Natural Sciences at Colorado State University. The goal of the Program is to prepare students for careers of excellence in neuroscience research and teaching. Cognitive Neuroscience is an active and growing discipline at Colorado State University involving researchers in departments across campus.

Cognitive Neuroscience (CN) represents an exciting and rapidly expanding field. Graduate training in Cognitive Neuroscience provides students with the opportunity to develop a close and collaborative relationship with their primary advisor. Incoming students are assigned to a particular faculty member (or members) based on mutual research interests. At the present time, faculty members within CN have active research programs in the areas of biological psychology, neural mechanisms of human visual perception, clinical neuroscience, and, and cognitive neuroscience of learning and memory. The range of faculty interests allows broad instruction across the field of neuroscience as well as advanced training in specialized areas.

Program Objectives

The graduate program in Cognitive Neuroscience was built around the ideals of high-quality education and training in advanced research. The faculty in Cognitive Neuroscience and graduate students meet regularly to discuss current and ongoing research. An early emphasis on laboratory research allows graduate students in the Program the opportunity to rapidly participate in the exciting process of disseminating their research findings to the larger scientific community. The general goal of the Program is to prepare students for productive research and teaching positions in the traditional academic setting, as well as research scientist positions in government and industry. This training goal is achieved through coursework, research experience, teaching experience, and scholarly activities within and outside the Program.

All students in the Cognitive Neuroscience Program develop skills and sophistication in research methods, experimental design, and statistical analysis by completion of courses during their first year of graduate study. Additional coursework in the form of CN core courses provides a comprehensive foundation in neuroscience; and additional core courses outside the Program provide exposure to other fields of psychology. Specialization within neuroscience is achieved through participation in advanced seminars as well as active involvement in research. Since the goal of the faculty is to foster a student's development from novice to collaborator, students are expected to be actively engaged in research throughout their training.

Graduate student interdisciplinary research is encouraged. Collaborations with faculty in departments such as Biomedical Sciences, Biology, Computer Science, and Statistics are on- going and some Program faculty are affiliated with the campus-wide Molecular, Cellular, & Integrative Neuroscience (MCIN) program. This affiliation provides students with important opportunities to collaborate with other laboratories on campus. In addition, a colloquium series is offered each semester in which students, faculty, and outside researchers may participate.

Because many of our students pursue careers in academia, the Program promotes development of strong teaching skills. As part of the curriculum, all students obtain direct teaching experience through supervised teaching of two different undergraduate laboratory courses. In addition, the Department of Psychology administers a Teaching Fellows Program that involves the supervised instruction of General Psychology and more advanced Psychology courses. There are also opportunities for graduate students to teach lecture courses within the department during regular semester sessions or condensed summer sessions. Students may also elect to participate in


Near Infrared Spectroscopy

lectures, seminars, and workshops on teaching offered by the Department of Psychology, School of Education, and The Institute for Learning and Teaching (TILT).

The Cognitive Neuroscience Program offers a Doctor of Philosophy (Ph.D.) degree. A Master's (M.S.) degree is awarded, but only as part of the requirements toward attaining the Ph.D. Students seeking admission should be firmly committed to the completion of the Ph.D. The program of study is designed to be completed in four to five years; students admitted with a Master's degree in Psychology or a related discipline can expect to complete requirements for the Ph.D. in two to three years.

During the first year of study, graduate students are required to complete a two semester sequence in Statistics (Methods of Research in Psychology I and II), as well as core courses and seminars in Cognitive Neuroscience (see specific course requirements listed below). It is expected that all course requirements will be completed during the student's first three years of graduate study.

The program is designed so students complete and defend their master's thesis by the end of their second year of graduate study. Students who successfully complete their master's thesis plus at least 32 credits of graduate coursework are granted a Master of Science (M.S.) degree in Psychology. During the third year of graduate study, students complete a comprehensive examination administered by the student's dissertation committee. Performance on the examination is used to determine if the student is prepared to continue in the program with their dissertation research. The fourth year of graduate study (and fifth, if necessary) is devoted primarily to completion of the doctoral dissertation. The dissertation and any remaining Program, Department, and University requirements should be completed within two to three years of completion of the M.S. degree. Upon completion of all requirements, students are granted a Doctor of Philosophy (Ph.D.) degree in Psychology.

Graduate training in the CN Program includes the following course requirements:

1. A two-semester sequence in Methods of Research in Psychology (i.e., Statistics).
2. Two core courses within Cognitive Neuroscience : Sensation and Perception, Cognitive Neuroscience, or Neuropsychology.
3. Two core courses taken from two different areas outside of Cognitive Neuroscience (e.g. Cognitive Processes, History & Systems, Social Psychology)
4. A third core course in Cognitive Neuroscience (other than the two used to fulfill Requirement #2) or an alternative course approved by the program (e.g. BS545 Neuroanatomy, Multivariate Analysis).
5. A minimum of four specialty seminars, with the expectation that students will enroll in a seminar each semester after their first year. The majority of content of two of the four seminars MUST concern Cognitive Neuroscience methodology.
6. Ongoing enrollment in the Cognitive and Clinical Neuroscience seminar.

A typical course schedule is shown on the next page. This schedule is presented for illustrative purposes only; the specific set and sequence of courses will be tailored to each individual student's interests and training goals. For example, although students in the Program must complete two Cognitive Neuroscience core courses, the specific courses used to fulfill requirements 3, 4 and 5 will vary from student to student. Further customization is possible based on the student's selection of seminars and electives. Given the interdisciplinary nature of neuroscience, students may elect to take courses outside

the Department of Psychology to further develop their specific training goals.

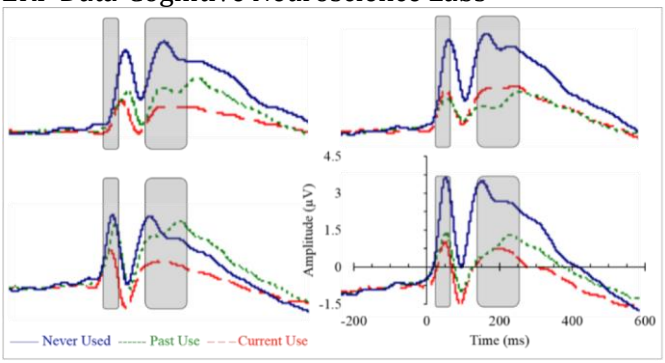
Students may petition Program faculty for course and requirement substitutions or waivers in order to pursue individual educational goals. In addition, courses taken at other institutions (e.g., for students entering with a master's degree) may be used to waive a course requirement if the course from the previous institution is comparable in level and content to the one taught at CSU.

Research & Teaching

Research involvement and the development of research skills are an integral part of doctoral training in the Cognitive Neuroscience Program. Students are expected to be actively involved in research each semester they are enrolled in the program. New students typically begin research projects during their first year under the close supervision of their faculty advisor and become more independent as their graduate careers progress. Research Practicum, Thesis, and Dissertation courses are the mechanism by which academic credit is given for this activity.

Students also develop teaching skills and get direct teaching experience via the CN Program's teaching requirement. All students are required to teach at least one semester of two different laboratory courses from our undergraduate offerings in sensation and perception, biological psychology and cognitive neuroscience. Students in the Program are given primary responsibility for teaching the course and evaluating students, but is closely supervised by a faculty member.

ERP Data-Cognitive Neuroscience Labs



To promote the development of communication and presentation skills, and to encourage scholarly interaction with faculty and peers, all students are expected to participate in our monthly colloquium series during the first year of their graduate training. Credit for this activity is attained through enrollment in the course entitled Group Study: Cognitive and Clinical Neuroscience. This series provides exposure to different perspectives on the field and the opportunity to interact with professors from other departments and institutions.

An advisory committee is formed for each student in the Program and consists of the faculty advisor and two to three other faculty members. The specific structure of the committee is determined according to directives from the graduate school. The advisory committee assists the faculty advisor in guiding the student through the program, and is also responsible for evaluating competency on the master's thesis, Advancement- to-Candidacy exam, and the dissertation. In addition, Program faculty members meet and discuss the progress of new students at the end of each semester during the first year. After the first year, students are evaluated on an annual basis. The purpose of these evaluations is to provide written feedback to the student regarding their performance in course work, teaching, research, and whether they are making timely progress in the Program. A formal evaluation is performed after completion of the M.S. to assure the student is a suitable candidate for doctoral study

Sample Cognitive Neuroscience Program Course Schedule:

Course	Credits	Course	Credits
Fall I		**Spring I**	
PSY652: Research Methods I	3	PSY653: Research Methods II	3
CN Core: Neuropsychology	3	CN Core: Cognitive Neuroscience	3
Seminar: Research Ethics	1	Seminar: Cognitive and Clinical Neuroscience	1
Seminar: Cognitive Neuroscience Methods	3	Thesis	1
Seminar: Cognitive and Clinical Neuroscience	1		
Fall II		**Spring II**	
Core course outside CN: History and Systems	3	Core course outside CN: Cognitive Psychology	3
Seminar: Cognitive and Clinical Neuroscience	1	Seminar: Cognitive and Clinical Neuroscience	1
Thesis	1	Thesis	3
Electives (optional)	1-3	Electives (optional)	1-3
Fall III		**Spring III**	
Core course outside CN: Neuroanatomy	4	Seminar: Cognitive and Clinical Neuroscience	1
Seminar: Cognitive and Clinical Neuroscience	1	Seminar: Cognitive Neuroscience Specialty Seminar	3
Advanced Research Practicum	3	Independent Research	3
Electives (optional)	1-3	Electives (optional)	1-3
Fall IV		**Spring IV**	
Seminar: Cognitive and Clinical Neuroscience	1	Seminar: Cognitive and Clinical Neuroscience	1
Dissertation	6	Dissertation	6
Electives (optional)	1-3	Electives (optional)	1-3
In addition, Cognitive Neuroscience Methods training consists of 4 required components:	1. 2. 3. 4.	Face to face interaction with program faculty in office and laboratory settings. Core courses with relevant methodological content: e.g., PSY600 (B, C, D, F, L or M) (students do not need to take all of these, but need a combination that meets the other requirements for cores). Taking the ongoing PSY692E/792E "Cognitive and Clinical Neuroscience" brownbag seminar. 2 specialty seminars (600 or 700 level) concerning Cognitive/Clinical Neuroscience methodology.	

Students in the Program draw on the guidance, support, and expertise of faculty members in an environment providing an excellent student/ faculty ratio (2:1). Program faculty members in Cognitive Neuroscience have acquired a strong national/ international reputation. Faculty members are recipients of numerous scientific research grants funded by prestigious federal organizations including the National Institutes of Health and the National Science Foundation, as well as College and University Teaching Awards.

Faculty include:

Deana B. Davalos, Professor
Colorado State University, 2000.
Specialization: clinical neuroscience, temporal processing, aging and cognition, neurophysiology.
Phone: 970.491.5548
Email: **deana.davalos@colostate.edu**

Emily Merz, Assistant Professor
Ph.D., University of Pittsburgh, 2012
Specialization: early experience, socioeconomic factors, brain development, self-regulation, developmental psychopathology
Phone: 970.491.2317
Email: emily.merz@colostate.edu

Don C. Rojas, Professor
Ph.D., Colorado State University, 1995.
Specialization: clinical neuroscience, neuroimaging, autism, schizophrenia, sensory and motor processes, biomarkers
Phone: 970.491.5213
Email: **don.rojas@colostate.edu**

Michael Thomas, Assistant Professor
Ph.D., Arizona State University, 2011.
Specialization: clinical neuroscience, advanced psychometric and neuroimaging methodologies in the study of cognitive psychopathology. aging schizophrenia
Phone: 970.491.6820
Email: **michael.thomas@colostate.edu**

Hollis Karoly, Assistant Professor
Ph.D., University of Colorado Boulder 2018.
Specialization: clinical neuroscience, addiction, alcohol and cannabis co-use, neuroimaging, gut-brain-axis, immune function
Phone: 970-491-3677
Email: **hollis.karoly@colostate.edu**

Dr. Deana Davalos' laboratory investigates temporal processing, aspects of cognitive aging, neurophysiology of aging, and cognitive processes in clinical populations. One line of research focuses on understanding the development of time processing abilities over the life span. In particular, is there a relationship between one's ability to process time accurately and higher order cognitive skills? Dr. Davalos also studies time processing in clinical populations. Her research involves behavioral testing, EEG/ERP, and neuropsychological testing. She is also Director of the Aging Clinic of the Rockies.

Dr. Emily Merz studies how children's experiences shape their brain development. She employs neuroimaging techniques to study associations between socioeconomic factors and children's brain structure and function; the proximal factors, such as chronic stress, that explain those associations; and the implications of socioeconomic differences in brain development for cognitive and mental health outcomes. Her goal is to contribute to advances in practice and policy related to childhood socioeconomic disadvantage.

Dr. Don Rojas is interested in neurodevelopmental disorders such as autism, fragile x syndrome and schizophrenia. He uses a variety of neuroimaging techniques, including MEG, EEG, MRI and fNIRS, to examine sensory, motor and language-related brain activity with a focus on biomarker and endophenotype development.

Dr. Michael Thomas studies the development, refinement, and interpretation of neurocognitive measures used in research and clinical practice. In particular, his studies seek to answer questions such as: Can cognitive ability be measured independently

Research Facilities

Individual laboratories within the Cognitive Neuroscience faculty house the following major pieces of equipment:
-64-channel Neuroscan Synamp2 EEG system
-144-channel g.tec HiAmp EEG system
-NIRx NIRSscout Extended near infrared spectroscopy system with 32 detectors and 48 emitters
-Magstim 200 high-power magnetic stimulator
-High speed eyetracking, tDCS and more!

from cognitive effort? Can sub-components of ability be reliably dissociated? Is there an optimal level of task difficulty? Studies rely heavily on both psychometric and cognitive modeling, as well as on neuroimaging methods such as fMRI and EEG. Populations studied include individuals diagnosed with neurocognitive disorders such as dementia, schizophrenia, and traumatic brain injury.

Dr. Hollis Karoly studies the neural, molecular and behavioral mechanisms underlying addictive disorders, particularly alcohol and cannabis use disorders. She uses behavioral measures, molecular biology methods and neuroimaging to explore these questions. She is also interested in the role of the endocannabinoid system in alcohol use disorders, and her work has recently focused on co-administration of alcohol and cannabinoids (e.g., THC and CBD), using a mobile drug administration laboratory that adheres to federal guidelines restricting cannabis administration in academic research.

In addition to individual research laboratories, the Department also maintains and coordinates several shared-use laboratory facilities. For example, a state-of-the-art driving simulator facility exists that can be used for cognitive and perceptual research on driving. The simulator includes the full front-seat compartment of an actual Ford automobile, complete with standard controls and functioning instru-mentation. The system also provides tactile and proprioceptive feedback, surround sound, and high-resolution wrap-around graphics.

There is also a shared facility that includes an addition al EEG system with separate subject-running rooms and control rooms. The system is a 64-channel Neuroscan Synamp2 EEG device. We also have shared-use facilities set up to simultaneously run multiple participants in computer- based experiments.

Program faculty and students collaborate within the larger CSU community. The Computer Science department has expertise and equipment for conducting Brain Computer Interface studies. Faculty and students also have access to a 3T Siemens Skyra MRI system located at the Translational Medicine Institute

Translational Medicine Institute

Finally, program faculty and students can collaborate with facilities in Boulder and Denver to conduct state-of-the-art magnetoencephalography (MEG) studies.

The Program's research facilities are located adjacent to the Cognitive Neuroscience Program faculty. The graduate student offices, faculty offices, and research laboratories are all in close proximity to each other providing further opportunity for interactions among the students and faculty.

Admissions & Funding

Admission to the Cognitive Neuroscience Program is competitive and is based on applicant's transcripts, letters of recommendation, and a statement of interest.

The Cognitive Neuroscience program has suspended use of the GRE in admissions decisions during the 2020-2021 application cycle Applications are only accepted for admission to the fall semester. Students having either a bachelor's or master's degree will be considered.

All students in the Cognitive Neuroscience Program are admitted with the expectation that they will work toward the Ph.D. degree. Each student will work closely with a faculty mentor throughout their graduate career, and are encouraged to note in their application the faculty member(s) with whom their interests overlap.

It is the intent of the Program that students receive funding throughout their graduate training, though funding is contingent on the availability of funds and a student's timely progress in the program. Financial support comes from a variety of sources including: teaching and research assistantships funded by the Department and University; research assistantships funded by government and private- sector grants to individual faculty members, and University- sponsored fellowships for outstanding students. In most cases, these assistantships provide a monthly stipend and tuition waiver. The Cognitive Neuroscience Program generally only offers full funding through the first 5 years of student progress towards a Ph.D.