Doctoral Program Brochure

2011-2012

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Colorado State University®

Knowledge to Go Places

Cognitive Neuroscience Doctoral Program

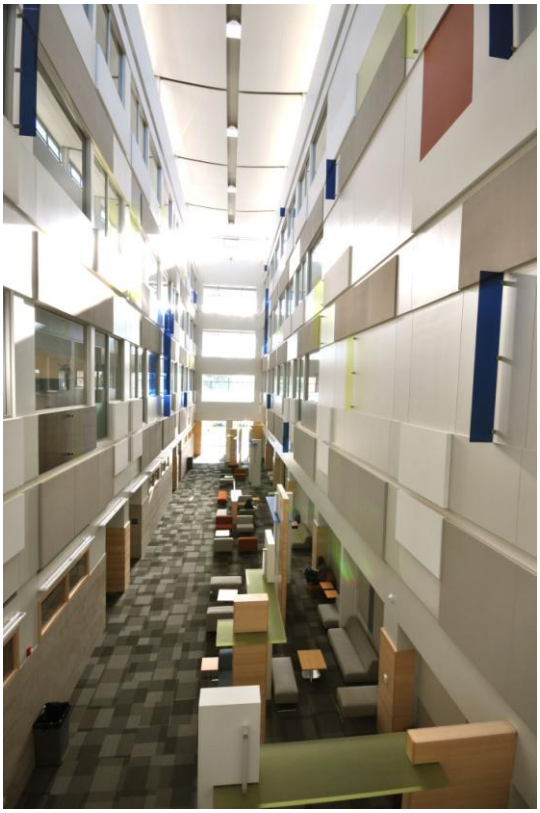
The Graduate Program in Cognitive Neuroscience is a competitive doctoral training program in the College of Natural Sciences at Colorado State University. The goal of the Program is to prepare students for careers of excellence in neuroscience research and teaching. Cognitive Neuroscience is an active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

Cognitive Neuroscience represent an exciting and rapidly expanding field. Graduate training in Cognitive Neuroscience at Colorado State University provides students with the opportunity to develop a close collaborative relationship with a 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 the Program have active research programs in the areas of physiological psychology, neural mechanisms of human color perception, clinical neuroscience, biological foundation of perceptual and cognitive capacities, and cognitive neuroscience of learning and memory. The wide 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 designed around the ideals of high-quality education and advanced research. Cognitive Neuroscience faculty 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 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 regular 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 most Program faculty are affiliated with the campus-wide Molecular, Cellular, and Integrative Neuroscience (MCIN) program. This affiliation provides students with important opportunities for to collaborate with other laboratories on campus. In addition, a weekly colloquium series is offered each semester in which students, faculty, and outside researchers 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. 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 lectures, seminars, and workshops on teaching offered by the Department of Psychology, School of Education, and Office of Instructional Services.

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, as well as core courses and seminars in Cognitive Neuroscience (see specific course requirements listed below). As part of the curriculum, students also complete at least one core course in the area of cognitive psychology and at least one core course in Cognitive Neuroscience or an additional area of the student's choosing. It is expected that all course requirements will be completed during the student's first two to three years of graduate study.

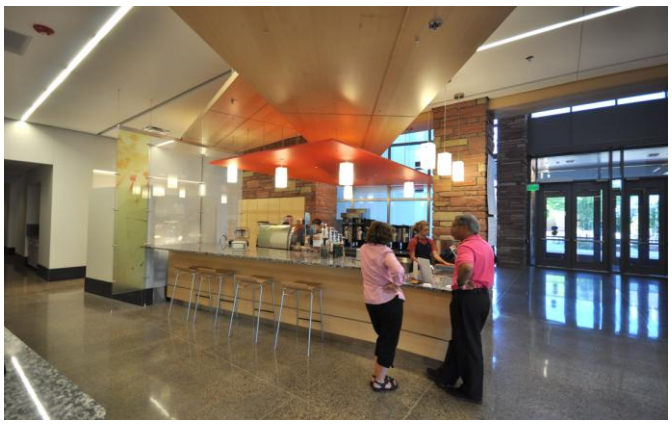
The program is designed so students complete and defend their master's thesis by the end of their second year of graduate study. Students who successfully complete their master's thesis plus at least 32 credits of graduate coursework are granted a Master of Science (M.S.) degree in Psychology. During the third year of graduate study, students complete a written Advancement-to-Candidacy Examination administered by the student's dissertation committee. Performance on the examination is used as a basis for determining 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 Cognitive Neuroscience Program includes the following course requirements:

1. A two-semester sequence in Methods of Research in Psychology (i.e., Statistics).
2. Research Issues and Models.
3. Two core courses in Cognitive Neuroscience : Sensation and Perception, Physiological Psychology, or Neuropsychology.
4. Two core courses taken from two different areas outside of Cognitive Neuroscience (e.g. Cognitive Processes, Human Learning and Memory, History & Systems. Social Psychology).
5. A third core course in Cognitive Neuroscience (other than the two used to fulfill Requirement #3) or an alternative course approved by the program (e.g. BS545 Neuroanatomy, Multivariate Analysis).
6. A minimum of four specialty seminars, with the general expectation that students will enroll in a seminar each semester after their first year.
7. Continuous enrollment in Current Issues in Cognitive and Neural Sciences.

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.



Sample Course Schedule:

Course	Credits	Course	Credits
Fall I		**Spring I**	
Methods of Research in Psychology I	4	Methods of Research in Psychology II	4
Research Issues and Models	3	Core Course: Cognitive Neuroscience	3
Core Course: Cognitive Neuroscience	3	Research Practicum	3
Group Study: Current Issues	2	Group Study: Current Issues	2
Electives (optional)	1-3	Electives (optional)	1-3
Fall II		**Spring II**	
Core Course from CN or other Program: Neuroscience	3	Core Course: Cognitive Psychology	3
Seminar	3	Seminar	3
Thesis	3	Thesis	3
Group Study: Current Issues	2	Group Study: Current Issues	2
Electives (optional)	1-4	Electives (optional)	1-4
Fall III		**Spring III**	
Core Course from other Program	3	Neurobiology or Other Approved Course	3
Seminar	3	Seminar	3
Advanced Research Practicum	3	Advanced Research Practicum	3
Group Study: Current Issues	2	Group Study: Current Issues	2
Electives (optional)	1-4	Electives (optional)	1-4
Fall IV		**Spring IV**	
Seminar	3	Seminar	3
Dissertation	6	Dissertation	6
Group Study: Current Issues	2	Group Study: Current Issues	2
Electives (optional)	1-4	Electives (optional)	1-4

Research & Teaching

Research involvement and the development of research skills are an integral part of doctoral training in 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 by virtue of the 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, physiological psychology (human or animal), and cognitive psychology. The student is given primary responsibility for teaching the course and evaluating students, but is closely supervised by a faculty member.

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 weekly colloquium series throughout their graduate training. Credit for this activity is attained through enrollment in the course entitled Group Study: Current Issues in Cognitive and Neural Sciences. 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 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

coursework, 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.

Program Faculty

Students in the Program draw on the guidance, support, and expertise of faculty members in an environment that provides an excellent student/faculty ratio (2:1). Program faculty members in Cognitive Neuroscience at Colorado State University 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.

Current faculty include:

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

Patrick Monnier, Assistant Professor
Ph.D., Wright State University, 1999
Specialization: Human color perception, neural modeling, visual attention.
Phone: 970.491.5293
E-mail: **patrick.monnier@colostate.edu**

Janice L. Nerger, Professor*
Ph.D., University of California San Diego, 1988.
Specialization: neurophysiological bases of human color vision, peripheral color perception.
Phone: 970.491.6864
Email: **janice.nerger@colostate.edu**
* Dean of College of Natural Sciences

Lucy J. Troup, Assistant Professor
Ph.D., University of Plymouth, 1995.
Specialization: color processing in the retina, neurophysiology of the visual system, neural modeling of the visual system
Phone: 970.491.6820
E-mail: **lucy.troup@colostate.edu**

Vicki J. Volbrecht, Professor
Ph.D., University of Colorado Boulder, 1988.
Specialization: neurophysiological bases of human color vision, peripheral color perception.
Phone: 970.491.7553
Email: **vicki.volbrecht@colostate.edu**

Other faculty in the Department of Psychology with interests in Perceptual & Brain Sciences and related areas: **Benjamin A. Clegg** (human performance, skill acquisition, visual cognition), **Edward L. DeLosh** (Human learning and memory, concept learning and conceptual representation, mathematical modeling of cognitive processes), and **Carol Seger** (human concept and categorization).

Dr. Deana Davalos coordinates an active research laboratory investigating temporal processing, aspects of cognitive aging, developmental neurophysiology, 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 such as planning, sequencing, and executive functioning? Dr. Davalos also studies time processing in clinical populations. Her research involves behavioral testing, EEG/ERP, and neuropsychological testing. Dr. Davalos maintains active collaborations with the University of Colorado Health Sciences Center, University of Colorado at Colorado Springs, and the Center for Neurorehabilitiation Services.

Dr. Patrick Monnier is interested in how humans perceive the world, and in particular, how humans perceive colors. He is especially interested in the influence of context on color appearance, what is commonly referred to as chromatic induction. In this work, Dr. Monnier uses psychophysics to make quantitative estimates of color appearance using well-calibrated computer monitors and by having observers make color matching judgments. The quantitative measurements are then used to deduce the neural substrate that gives rise to these percepts. Another area of interest is visual attention, especially how color can guide visual search. A practical application of Dr. Monnier's work is the development of better interfaces where color may be used to code information efficiently while minimizing errors.

Dr. Janice Nerger is interested in understanding the neural mechanisms underlying human color vision. Her research examines how color perception differs in different retinal regions and how those differences are indicative of the underlying neural substrate. Dr. Nerger's research group is investigating how retinal topology and rod photoreceptor signals affect color perception with the ultimate goal being to develop a physiologically plausible model of human color vision. The Vision Laboratory consists of a Maxwellian-view optical system interfaced to a computer and numerous color vision diagnostics. Dr. Nerger has received international recognition for her research as a recipient of the Rank Prize Award in Vision Research given by the Rank Foundation of the United Kingdom.

Dr Lucy Troup's research interests center on understanding the relationship between low level brain processes and high level perception. Particularly Top-Down and Bottom-Up Models of perception and integration of both high and low level information across brain regions (Cortical and Cognitive Binding). Current approaches in the Troup lab to addressing this relationship include traditional experimental approaches and brain imaging, including a developing research program in Event Related Potentials and Electroencephalography (EEG). Dr Troup also conducts research in Human Computer

Interaction, with an emphasis on collective consciousness and technology.

Dr. Vicki Volbrecht investigates the neural processes mediating color perception. The major focus of her research is the study of color vision in the peripheral retina and the differences between foveal and peripheral color perception. Overall, Dr. Volbrecht's work seeks to assess the role of rods in color perception using bleach and no-bleach procedures. This work is conducted on a Maxwellian-view optical system interfaced with a computer. All psychophysical observers are tested for color vision deficiencies using pseudisochromatic plates, several panel tests, and Neitz anomaloscope.

Research Facilities

In addition to individual research laboratories, the Program also maintains and coordinates several shared-use laboratory facilities. The most recent acquisition is a state-of-the-art driving simulator facility to 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 instrumentation. The system also provides tactile and proprioceptive feedback, surround sound, and high-resolution wrap-around graphics.

We also house a new EEG/ERP facility. The facility includes two EEG systems with separate subject-running rooms and separate control rooms. One system is a state-of-the-art 128-channel Electrical Geodesic system that supports source localization and uses a proprietary technology that allows the cap to be applied and tested in just 10-15 minutes. The second system is a 64-channel NeuroScan system for conducting traditional EEG studies. We also have shared-used facilities set up to simultaneously run multiple participants in computer-based experiments. Also available is a modern eye-tracking system for research in areas such as attention, psycholinguistics, web design, and computer usability.

In addition, the Program is equipped with systems geared toward the psychophysical investigation of human vision. For example, a multi-channel Maxwellian-view optical system is used to study aspects of visual adaptation and color vision. One of this system's unique characteristics is its ability to produce extremely high light intensities at the discrete wavelengths across the visible spectrum. The Program also hosts several television-like systems to study various aspects of visual perception, with a particular emphasis on color vision. The advantage of these television systems is that spatially elaborate images can be produced, allowing for the investigation of color vision within complex scenes.

The Program's research facilities are located in a common area that is adjacent to the research facilities of 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 is competitive and is based on transcripts, GRE Scores, letters of recommendation, and a statement of interest. 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 in the Program 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.

For additional information on the Program, contact any of the Program faculty listed in this brochure.

Applications for admission must be submitted online (http://www.colostate.edu/Depts/Psychology/gradapply.shtml) no later than January 15. Supporting documents must be postmarked no later than January 15.