

**University of Kentucky**  
**Department of Psychology- Experimental Psychology Program:**  
**Cognitive Neuroscience Area**

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**AREA HANDBOOK**

The Cognitive Neuroscience area of concentration is part of the Experimental Psychology Program and is designed to train students broadly in the general theoretical principles and technical approaches used to investigate the neurobehavioral mechanisms of alcohol and drug abuse. Psychopharmacological approaches to understanding basic principles of learning are also emphasized. Students receive a concentrated lab experience using either animal models (quail, mice or rats) or human participants. Faculty in the program use different levels of analysis including cell culture models, neurochemical assays, developmental toxicology, classical conditioning of drug effects, operant conditioning, human behavioral pharmacology, cognitive, and quantitative modeling. Students are expected to receive in depth training in at least one level of analysis although training that integrates more than one level of analysis is strongly encouraged.

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## **PROGRAM REQUIREMENTS**

### COURSE REQUIREMENTS

(1) Statistics sequence:

PSY 610 - Experimental design

PSY 611 - Correlational design

(2) PSY 780 – Problems in Psychology: Directed Readings in Cognitive Neuroscience (section to be determined each semester)

\* this requirement includes two PSY 780 courses taught sequentially

(3) Any of three proseminars selected from the following areas

\* note that another course (typically a 700-level course) may be substituted for one or more of these proseminars, pending approval of the student's supervisory committee

Learning

Cognitive processes

Developmental Psychology

Sensation & Perception

Physiological Psychology

(4) Four electives (a minimum of one of these must be outside of the Psychology Department; see listing of some possible options on pages 7-8).

(5) Additional course work as recommended by the advisory committee

(6) All Cognitive Neuroscience students are required to attend the Professional Development Series seminar, our weekly, 1 hour seminar for Cognitive Neuroscience faculty and students. After the first year in the program, all students are required to present once per year.

### RESEARCH REQUIREMENTS

It is expected that all students in the Cognitive Neuroscience area will be involved in research throughout their course of study towards the Ph.D. The area has two formalized requirements that are designed to train the student in conducting research:

-Master's thesis

-Dissertation

### ALLIED AREA REQUIREMENT

Each student is required to develop an allied area to gain expertise in some area outside of the student's main research specialty. This requirement can be satisfied by various combinations of course work and research or professional experience, as described previously for the Experimental Program. The selection of an appropriate allied area project will be made by the student in consultation with the advisory committee. Completion of this requirement occurs prior to scheduling the qualifying examination.

## QUALIFYING EXAMINATION

Each student must pass the qualifying examination to be promoted to doctoral candidacy. The exam is intended to be a demonstration that the candidate has developed a broad, defensible perspective on his or her area of study. The specific content and format of the examination will be determined in discussions between the student and the advisory committee. There are currently two common options for the written portion of the qualifying exam- **Option 1:** The student may complete a written component in their specialty area (e.g., a critical review of the literature or a grant application - both with the intent of eventual submission); **Option 2:** the student may take the entire written qualifying exam as a sit-down essay examination with questions submitted by advisory committee members.

The oral defense of the qualifying examination should be completed within a 6 week window as determined by the qualifying committee in conjunction with the student. Performance on the written portion of the qualifying examination will be evaluated by the dissertation advisory committee, with 1 of 3 possible outcomes: pass, fail, or remedial work required. In the event of a pass on the written exam, the student will schedule the oral defense with the Graduate School. In the event of a failure on the written exam, the student is allowed to retake the written examination within one year. A second failure will result in a dismissal from the program. In the event that remedial work is required, the nature of the work will be determined by the advisory committee and should be completed prior to the oral defense. When the written examination is passed with remedial work, the oral defense can be scheduled with the Graduate School.

## TEACHING REQUIREMENT

All students are required to gain teaching experience, generally consisting of one or more semester's service as a teaching assistant or instructor. Alternatively, Cognitive Neuroscience graduate students can satisfy our teaching requirement by completing 10 hrs (not required to be contiguous) of in-class lecture in an undergraduate class of a Cognitive Neuroscience faculty who must agree to serve as a teaching mentor; or by teaching a 3 credit course at a University other than UK during their graduate education.

Students are also encouraged to take courses and attend workshops pertinent to teaching, especially if teaching is a part of one's primary career goal. In consultation with Dr. Friedrich, the Director of Undergraduate Studies for the Department of Psychology and their primary mentor, a formal "teaching specialty" may be pursued, which can serve as an allied area for interested students.

### The Graduate Certificate in College Teaching and Learning.

The Graduate School offers a 12-credit-hour Certificate, including a required 3-credit-hour supervised practicum experience, based on coursework that integrates the theory and practice of College teaching with tangible documentation of expertise in College teaching. Alternatively, students may complete only 1 or 2 courses in this curriculum, which still allows the student to document the educational experience of preparing to teach at an institute of higher learning. For example, the course GS 650 (Preparing Future Faculty) is offered by the Graduate School as an introduction to this topic. Additional courses may be found at <https://gradschool.uky.edu/courses>.

This program is designed to provide a coherent, integrated approach to helping graduate students develop and document the skills needed as part of conscientious preparation for the full range of faculty responsibilities at a range of institutions of higher education.

More information can be obtained by visiting the following web address:

<https://gradschool.uky.edu/preparing-future-faculty>.

## TRANSFERRING GRADUATE CREDIT FROM OTHER INSTITUTIONS

Entering students are required to fulfill all of the requirements outlined above. However, students may petition to have a previous Master's degree or selected course work count towards completion of the Ph.D. in the program. In the case of students entering with a Master's degree from another institution, an advisory committee will be formed immediately upon acceptance into the program, to review the transfer of the previous degree. The charge of the committee will be to determine which program requirements the student may fulfill by transferring graduate work from another institution. Copies of the Master's thesis should be provided to the committee. This committee will also be responsible for setting a timetable for progress towards completion of the allied area requirement, the qualifying examination, and the dissertation. Students may also petition this temporary committee to transfer individual graduate courses taken at another institution on a course-by-course basis. Students are expected to provide course syllabi and supporting materials so that a relevant faculty member can determine if it fulfills the Cognitive Neuroscience course requirement.

## STUDENT SUPERVISION

Student supervision occurs on three levels: primary faculty advisor, faculty advisory committee, and the entire Cognitive Neuroscience faculty. Each student will choose (or be assigned) a primary advisor, or mentor, upon entering the program. The student in consultation with the mentor will form an advisory committee. Prior to the Master's thesis, the advisory committee will consist of the mentor and two additional faculty members. After the thesis is completed, the advisory committee will consist of the mentor and three additional faculty members, one of whom must have a primary appointment outside of Psychology. The advisory committee will play a critical role in advising throughout a student's graduate career. The advisory committee is primarily composed of faculty within the area, but other departmental faculty, faculty from other units at the university, and in some cases from other institutions, can also serve. As noted above, there are two different advisory committees that supervise the student during the various stages of their training: (1) Master's advisory committee and (2) dissertation advisory committee. There is usually considerable overlap in the composition of these committees, but students do have the flexibility to reconstitute their committee if their interests change or they desire to change the committee for other reasons. There are four points during a student's career that constitute logical points at which the composition of the advisory committee are considered: (1) during the first semester of matriculation, the student must form an initial advisory committee; (2) at the point where a Master's thesis project is defined, the committee might undergo a change; (3) upon completion of the thesis, the dissertation advisory committee must be formed; (4) upon completion of the qualifying exam, a student might elect to make changes in the dissertation advisory committee for supervision of the dissertation.

## MASTER'S ADVISORY COMMITTEE

The primary responsibility of this committee is to guide completion of the Master's thesis. This committee will consist of the student's mentor and (at least) two other faculty members; the student's initial advisory committee may well serve as the thesis committee. The student will consult with this committee to develop a research idea that is then formalized into a Master's thesis proposal. This committee will determine the adequacy of the proposal, guide completion of the project, supervise other aspects of the student's academic progress during this time, and conduct the oral defense of the Master's thesis. **This process requires adherence to several**

**Graduate School policies that you should review when appropriate, these may be found in the following document:**

[http://gradschool.uky.edu/sites/gradschool.uky.edu/files/check\\_sheet\\_for\\_masters\\_thesis\\_students\\_Plan\\_A.pdf](http://gradschool.uky.edu/sites/gradschool.uky.edu/files/check_sheet_for_masters_thesis_students_Plan_A.pdf)

## DISSERTATION ADVISORY COMMITTEE

During the semester following successful defense of the Master's thesis, the student must form a committee that will supervise the qualifying examination and dissertation. **This committee should be formed 1 year prior to the qualifying examination.** This committee typically includes the same members as previous advisory committees and will consist of the student's mentor, who must be a member of the Department of Psychology, and a minimum of three additional faculty members, at least one of whom does not have an appointment in the Department of Psychology. The Graduate School will assign another faculty member from outside of Psychology to serve as the "Outside Examiner", who will serve to monitor the fairness of the dissertation defense process. All members must be full members of the Graduate Faculty. Two of these members should be from the Cognitive Neuroscience area. If the student's mentor/supervisor is not a full member of the graduate faculty, a co-supervisor who is a full member of the graduate faculty must be appointed. One purpose of the committee is to advise and approve the allied area plan. Another purpose of the committee is to guide the preparation and completion of the student's qualifying examination, including both written and oral components. This committee is also responsible for supervising academic progress during the remainder of the student's tenure, including the development, completion, and evaluation of the student's Ph.D. dissertation. Each student will develop a formal dissertation proposal, which will be evaluated by the committee. In accord with guidelines of the Graduate School, this committee will also conduct the oral defense of the dissertation, which is the final formal requirement for the Ph.D. **This process requires adherence to several Graduate School policies that you should review when appropriate, these may be found in the following document, [http://gradschool.uky.edu/sites/gradschool.uky.edu/files/check\\_sheet\\_for\\_doctoral\\_students.pdf](http://gradschool.uky.edu/sites/gradschool.uky.edu/files/check_sheet_for_doctoral_students.pdf)**

## POST-GRADUATION CAREERS

After obtaining their doctorates, our students have gone on to a wide variety of careers. Those pursuing careers in academia have entered post-doctoral positions at research universities, or gone directly into faculty positions at teaching/research universities and liberal arts colleges across the U.S. Other students have gone into the private sector (research foundations, pharmaceutical industry, non-profit, scientific writing organizations), or into research positions at state or federal agencies. According to the U.S. Bureau of Labor Statistics, the median annual income for "Social Scientists and related workers" with an advanced degree is \$81,340, as of May 2018. In addition, those who have an advanced degree and are employed in the "Medical Sciences", including neuroscience, have a median income of \$84,810 per year.

## \*REQUIRED DOCUMENTATION OF SUPERVISORY COMMITTEE MEETINGS

All Cognitive Neuroscience students are required to prepare a written "minutes" for committee meetings, detailing all pertinent details regarding any decisions made or requirements discussed. These minutes must be circulated electronically to all committee members for approval or revision, with electronic reply kept as an official record of final minutes approval.

## ANNUAL EVALUATIONS

Students will receive explicit, timely feedback concerning their progress in the program. Students will be evaluated by the faculty of the program at several points during their academic careers.

All students will be evaluated by Cognitive Neuroscience faculty at the end of each academic year. Students will complete a summary statement regarding their accomplishments each year and these accomplishments will be evaluated against students' and supervisors' goals at the beginning of the academic year. In addition, any other information relevant to an evaluation of the student's professional progress will be considered (e.g., performance in teaching assignments, class participation, etc.). Each student will be assigned a numerical evaluation of their academic and research performance. A numerical score of 1 (needs improvement), 2 (meets expectations), or 3 (exceeds expectations) will be assigned to both areas of performance. All Cognitive Neuroscience faculty (and those in other Areas) may contribute to the drafting of the end of the year evaluation letter, which will be reviewed/approved and signed by the Cognitive Neuroscience Coordinator and Director of Experimental Training before it is conveyed to the student. A short meeting may also be set up for each student to meet with the Cognitive Neuroscience faculty to solicit comments and feedback.

## **\*RECOMMENDED TIMETABLE OF PROGRESS IN THE PROGRAM**

Fall of first year: Initial advisory committee formed and meets

Spring of first year : Master's advisory committee formed

Fall of second year: Master's thesis proposed and research begun

Spring of second year: Master's thesis defended

Fall of third year: Dissertation advisory committee formed

Spring of third year: Allied area work completed

Fall of fourth year: Qualifying examination passed

Spring of fourth year: Dissertation proposal accepted

Fifth year: Dissertation defended

\* Students entering with prior graduate work will have a determination made of an appropriate timetable determined by a temporary advisory committee.

## MASTER'S THESIS

**The end of the fourth semester in the program is the goal for the completion of the Master's thesis.**

According to GSAC regulations, if the thesis is not completed by the start of classes in the sixth semester in the program, the student may have to meet with GSAC and could be subject to dismissal from the program.

## QUALIFYING EXAMINATION

The qualifying examination is the point in a doctoral program where a determination is made of whether the student will be promoted to **candidacy for the Ph.D.** **The examination consists of a written and oral component, as described previously. It is expected that the oral defense is completed by the end of the fourth year of matriculation. If the qualifying exam has not been completed by the start of classes in the ninth semester (i.e., Fall of fifth year), the student may be placed on probation.**

## ACADEMIC PROBATION

Students will receive explicit feedback about their progress in the program. In cases where the advisory committee rates either quality of performance or rate of progress to be inadequate, the Cognitive Neuroscience faculty may place the student on academic probation. When placed on probation, the Cognitive Neuroscience faculty will recommend a course of action that will allow the student to set goals for improvement. The student will receive a letter from the coordinator of the Cognitive Neuroscience area that outlines the nature of the problem leading to probation and the goals the student must achieve to end the probation period. A timetable for reaching these goals will be included in the letter. The student on probation will also meet with his/her mentor and the Cognitive Neuroscience coordinator to discuss the nature of the problem and the work needed for improvement. Probation periods will not normally extend beyond one year.
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## COURSE LOAD

The usual course load for students receiving nonservice fellowships (financial awards that do not require specific teaching or research participation) is 9-12 credit hours. The usual course load for students on teaching (T.A.) or research assistantships (R.A.) is 9 credit hours each semester, and assistantship duties are limited to a maximum of 20 work-hours/week. **A student must be officially enrolled with the graduate school for at least 9 credit hours in order to be considered a full-time graduate student until the Qualifying Exam is successfully completed.** Prior to completion of the Qualifying Exam, students may maintain full-time status by enrolling in required and/or elective courses AND enrollment in \*PSY 790 (Research in Psychology) or if 1 or more credit hours are needed to reach 9 credit hours. When the Qualifying Examination is successfully completed, students MUST register for 2 credit hours of PSY 767 (Dissertation Residency Credit) until successfully defending the Doctoral Dissertation. No other credit hours are required to meet full-time status following completion of the Qualifying Examination.

\* Not that students can enroll only for a maximum of 12 credit hours of PSY 790 during the course of their education, per rule of the Graduate School.

## STUDY PLANS

The program is intended to provide maximum flexibility so that each student can develop a plan of study that includes courses, research, and other experience pertinent to the student's career objectives. Remember that if the student has received funding from a particular program or training grant, there may be a limited number of course requirements for these programs. The course work is intended to provide a grounding in research methodology along with a solid background in neuroscience and behavioral pharmacology. In addition, the program offers several course electives geared to specific areas that are of specific interest to the student.

Possible elective courses: please keep in mind that many of these courses, below, are offered only during alternating semesters and/or years.

### Department of Psychology Courses:

PSY 564 Advanced Topics in Learning\*

PSY 565 Advanced Topics in Neuroscience\*



PSY 766 Topical Seminar in Cognitive Neuroscience\*

\* these courses vary by topic subheadings and can be taken repeatedly for credit \* note that other courses not listed above may be offered intermittently by Psychology faculty

Department of Behavioral Science Courses:

BSC 534 Ethics and Responsibility in Clinical Research  
BSC 731 Methods and Technologies in Clinical Translational Science  
BSC 732 Interdisciplinary Protocol Development  
BSC 772 Drugs of Abuse: Pharmacological, Clinical & Social Issues  
BSC 772 Topical Seminar on Drugs of Abuse  
BSC 776 Dependency Behavior  
BSC 745 Research Methods in Behavioral Science  
BSC 775 Human Response to Stress  
BSC 787 Biobehavioral Perspectives on Drug & Alcohol Abuse & Dependency

Department of Chemistry:

CHE 580 – Topics in Chemistry: Neurochemistry

Department of Pharmacology and Nutritional Sciences Courses:

PHA 622 (module #2 only)- Neuropharmacology (1 credit)  
PHA 710: Aging of the Nervous System

Department of Anatomy and Neurobiology:

ANA 516 Selected Topics in Advanced Neuroscience (Neuroanatomy)  
ANA 605 Neurobiology of CNS Injury and Repair

College of Pharmacy Courses:

PHS 663 Molecular Neurobiology of Abused Drugs  
PHS 711 Responsible Conduct of Research  
PHS 750 Pharmaceutical Sciences Journal Club  
PHS 760 (variable section #) Topics in Pharmaceutical Sciences (Journal Club)  
PHS 760 (variable section #) Drug Discovery, Development, and Translation  
PPS 764 Drug Development Regulation and Clinical Research

Department of Toxicology:

TOX 600 Ethics in Scientific Research

Department of Biology Courses:

BIO 535 Comparative Neurobiology and Behavior  
BIO 618 Molecular Neurobiology  
BIO 638 Developmental Neurobiology

Graduate School Courses:

GS 610 College Teaching  
GS 650 Preparing Future Faculty

Statistics: Graduate Certificate in Applied Statistics

STA 570 (Basic Statistical Analysis, 3 hours)

STA 674 (Regression Analysis and Design of Experiments, 3 hours)

STA 677 (Applied Multivariate Methods, 3 hours)

STA 678 (Statistical Computational Theory and Data Visualization: R and SAS, 3 hours)

Education: These courses are cross-listed as EPE

EDP 707- Multivariate Analysis

EDP 711- Advanced Quant Methods – variable special topics like Network Analysis and CART analysis

EDP 712- Advanced Psychometric Methods

EDP 713 – SEM

Public Health Biostats: Graduate Certificate in Biostatistics

BST 600 – Introduction to Biostatistical Methods (3 hrs)

BST 661 – Survival Analysis (3 hrs)

CPH 631 – Design and Analysis of Health Surveys (3 hrs)

CPH 634 – Analytics Methods of Healthcare Data (3 hrs)

CPH 636 – Data Mining in Public Health (3 hrs)

CPH 664 – Design and Analysis of Clinical Trials (3 hrs)

EPI 717 – Introduction to Causal Inference (3 hrs)

PPS 710 – Techniques in Secondary Data Research (3 hrs)

BST 655 – Introduction to Statistical Genetics (3 hrs)

BMI 520 – Designing for Data Visualization (3 hrs)

BMI 633 – Introduction to Bioinformatics (3 hrs)

BMI 733 – Biomedical Natural Language Processing (3 hrs)

CPH 635 – Databases and SAS Programming (3 hrs)

CPH 713 – Pharmacoepidemiology (3 hrs)

EDP 712 – Advanced Psychometric Methods (3 hrs)

## **FACULTY**

Chana Akins, Ph.D. University of Texas; 1994; Professor. Behavioral and neurobiological aspects of Pavlovian conditioning, drug and alcohol effects in birds.

Michael Bardo, Ph.D., Iowa State University, 1980; University Research Professor, Psychopharmacology, neuroscience, individual differences in drug abuse vulnerability, medication development.

Joshua Beckmann, Ph.D., Southern Illinois University, 2007; Professor. Learning, memory, and decision- making processes.

Mark Fillmore, Ph.D., University of Waterloo, 1993; University Research Professor. Human behavioral pharmacology, alcohol, caffeine, drug abuse, cognition, motivation.

Mark Prendergast, Ph.D., University of Nebraska, 1994; University Research Professor. Biochemistry of alcohol and drug dependence, traumatic brain injury, stress hormone biology, neuroscience education.

Lynda Sharrett-Field, Ph.D., University of Kentucky, 2013; Associate Professor. Neuroscience education.

Lauren Whitehurst, Ph.D. University of California, Riverside in 2018. Associate Professor. Dr. Whitehurst examines how autonomic and central nervous system factors interact to produce regulatory effects on cognition using experimental methodologies including electroencephalography, and pharmacology.

Anthony Zanesco, Ph.D. University of California, Davis in 2017. Assistant Professor. Dr. Zanesco studies attention mind wandering, and associated brain dynamics.