MS IN COGNITIVE AND BEHAVIORAL SCIENCES

The Master of Science in Cognitive and Behavioral Sciences (MS CaBS) program is dedicated to understanding how the central nervous system influences human behavior across the lifespan, including health, disease, typical and atypical development. By combining psychology, psychiatry, neuroscience, computation science, biochemistry, and genetics, the program aims to explore the fundamental principles underlying behavior.

Further, students will receive extensive training in experimental design and research techniques. This research includes physiological underpinnings of learning, memory, decision-making, motivation, emotion, and treatment effectiveness. Students will also work closely with dedicated research mentors on faculty research projects and a thesis.

Admission requirements for the Master of Science in Cognitive and Behavioral Sciences include:

- Bachelor's degree from an accredited institution of higher education or equivalent (if an international student) with a major in psychology, biology, statistics, neuroscience, or a related field.
- Grade point average of at least 3.0 on a scale of 4.0 on all undergraduate and graduate coursework.
- The GRE is not required.
- International students must have a Test of English as a Foreign Language (https://www.ets.org/toefl.html) (TOEFL), with a minimum score of 80 on the internet (TOEFL iBT version) or a minimum score of 6.5 on the International English Testing System (https://ielts.org/ielts-usa/) (IELTS) is required.
- Students with international college transcripts must submit a course-by-course evaluation report by either World Education Services (https://www.wes.org/) (WES) or Educational Credential Evaluators (https://www.ece.org/) (ECE). Final transcript credential evaluation results must be submitted with the application.
- A personal statement including purpose in applying, interest in the field in general, the program specifically, commitment to a career in cognitive and behavioral science following the degree, community service or outreach, past research experience, and, if the applicant desires, examples of success in overcoming any challenges faced in career path goals. This personal statement is mandatory and should not exceed one page.
- Previous research experience is encouraged but not required for the MS in CaBS program. However, if the applicant has previous research experience, the applicant is encouraged to include a list of references for any posters or papers that were related to the research in the personal statement, along with letters of recommendation from former teachers or mentors who can attest to the student's prior research experience.

The admissions committee for the MS in CaBS program will consider multiple factors beyond GPA and academic record. Factors including research experience, undergraduate program curriculum and objectives, honors and awards, community service and outreach, responsibilities outside of academia including family, and success in overcoming any challenges, if these have been discussed by the applicant, will all be considered when evaluating the application. Only full-time students will be accepted.

The Master of Science in Cognitive and Behavioral Sciences (MS CaBS) degree program is comprised of 36 semester credit hours (SCH) that includes coursework, research tutorials, and a thesis to graduate. The program is typically completed over two (2) years of full-time study.

In the first year of study, students are exposed to foundational knowledge and research in cognitive and behavioral sciences. Coursework covers essential topics such as responsible conduct of research, biological statistics and study design, neurobiology and neuroanatomy of complex behavior, and models of human cognition and behavior. Students also participate in a journal club to develop communication strategies through presentations and discussions, and complete research tutorials to gain hands-on research experience through lab rotations under faculty supervision.

The second year of study is dedicated to specialization and advanced research. Students engage in courses such as the biological basis of behavioral disorders and prescribed electives like advanced assessment and analysis of behavior, advanced data science for neuroscience, and applied behavioral genomics. They continue to participate in the journal club, present their research updates, and work on their thesis, which involves designing, conducting, analyzing, and disseminating research under faculty direction.

To graduate, students must complete a total of 36 SCH, including the successful defense of their thesis based on their research. The program's rigorous academic curriculum and practical training prepare students with the foundation to support mental health research in the fields of data sciences, enter academia and/or industry, be responsible for the execution of experiments designed by faculty members or supervisors, serve as program managers, carry out complex experiments, teach, or to transition into PhD and MD programs.

Course	Title	Hours
First Year		
Fall		
	Responsible Conduct of Research: The applied ethics course will be structured to include didactics, faculty panel discussion, on-line training, and student example case presentations. The course will align with the National Institutes of Health training recommendations and their training program in ethics. Course topics will include Informed Consent, Rigor and Reproducibility, Research Misconduct, Peer Review, Authorship, Identification and Reporting of Conflict of Interest, Plagiarism, including topics in Artificial Intelligence, and Collaboration.	1
	Biological Statistics & Study Design I: The study design component will cover experimental studies/randomized controlled trials and observational studies. Analytic approaches will cover generalized linear modeling with multilevel extensions for correlated data using both Frequentist and Bayesian inferential approaches.	3
	Neurobiology and Neuroanatomy of Complex Behavior: This course will cover topics related to the foundations of neurobiology, including neurochemistry, molecular and cellular neuroscience (action potential, synaptic transmission, receptors, and plasticity), systems neuroscience, introduction to neuroanatomy, and their influence on behavior.	3
	Research Tutorials (Rotations) 1 of 2: Students complete tutorial rotations under the supervision of two or more Cognitive and Behavioral Sciences faculty members by observing ongoing research. During the10-week rotation, students will spend the equivalent of five afternoons per week in the laboratory (20 hours per week for 10 weeks, for a total of 200 hours). In consultation with their faculty advisors, students will select the research areas which best support their educational goals. Repeat course once.	2
	Hours	**9**

Spring	
Models of Human Cognition and Behavior: Students become familiar with human cognition and behavior through an in-depth examination of cutting-edge models and theories. Students will critically evaluate various theoretical frameworks, computational models, and empirical research, gaining insight into topics such as decision-making, memory, emotion, social interaction, and problem-solving. By synthesizing perspectives across different fields such as psychology, neuroscience, and cognitive science, this course equips students with a deeper comprehension of the intricate mechanisms underlying human thought and behavior, fostering a solid foundation for further academic pursuits and clinical applications.	3
Biostatistics & Study Design II: The study design component will cover advanced experimental studies/randomized controlled trials and observational studies including flexible/adaptive designs, SMART designs n-of-1 clinical trials and stepped wedge designs. This course will expand the use of generalized linear models to non-normal, continuous outcomes, additional discrete outcomes as well as time-to-event data with multilevel extensions for correlated data using both Frequentist and Bayesian inferential approaches.	3
Journal Club: The Journal Club serves multiple practical purposes that allow students to learn about the principles of pedagogy and communication strategies, work to develop their own communication strategies through frequent presentations of recent high impact articles and receive feedback both from faculty and fellow students that will allow revision of these skills. The Journal Club will also be a forum for annual refreshers for ethics and a routine platform for discussions of controversial topics/scientific developments/recent publications. This will also be the forum for presentation of each student's own research/ research update each year.	1
Research Tutorials (Rotations) 2 of 2: Students complete tutorial rotations under the supervision of two or more Cognitive and Behavioral Sciences faculty members by observing ongoing research. During the10-week rotation, students will spend the equivalent of five afternoons per week in the laboratory (20 hours per week for 10 weeks, for a total of 200 hours). In consultation with their faculty advisors, students will select the research areas which best support their educational goals.	2
Summer research is optional	
Hours	**9**
Second Year	
Fall	
Biological Basis of Behavioral Disorders: This course will highlight current state of the art advances in technology that have led to an increased understanding of the biological basis of mental health disorders, including schizophrenia, bipolar disorder, depression, posttraumatic stress disorder, and substance use disorders. The course will include discussions on challenges that are unique to mental health disorders, and how knowledge of biological underpinnings can be translated to clinical treatments. The presentations will be led by researchers with expertise in the specific disorder, and will focus on recent publications on the topic, to facilitate an interactive discussion with students.	3
Prescribed Elective: Elective 1 of 2 (see elective table below)	3
Research: Once a student selects a mentor, they will conduct hands-on research every semester in the area of choice, designing a focused study to complete during the program's duration, in consultation with the faculty mentor.	3
Hours	**9**
Spring	
Prescribed Elective: Elective 2 of 2 (see elective table below)	3
Journal Club: The Journal Club serves multiple practical purposes that allow students to learn about the principles of pedagogy and communication strategies, work to develop their own communication strategies through frequent presentations of recent high impact articles and receive feedback both from faculty and fellow students that will allow revision of these skills. The Journal Club will also be a forum for annual refreshers for ethics and a routine platform for discussions of controversial topics/scientific developments/recent publications. This will also be the forum for presentation of each student's own research/ research update each year.	1
Thesis: Design, conduct, analyze, and disseminate research under the direction of faculty advisor. The thesis is a substantive piece of scholarship involving primary and secondary research, which serves to demonstrate mastery over the discourse, methods, and content of a particular topic under the umbrella of Cognitive and Behavioral Sciences.	2
Research: Once a student selects a mentor, they will conduct hands-on research every semester in the area of choice, designing a focused study to complete during the program's duration, in consultation with the faculty mentor.	3
Hours	**9**
Total Hours	**36**

Code	Title	Hours
PRESCRIBED ELECTIVES: Students choose 2 courses below		
	Advanced Assessment and Analysis of Behavior: This course will be focused on the design, methods and interpretation of outcomes research. The topics of this course will include utilization of novel technology to extract rich, ecologically valid behavioral data (e.g., virtual data collection, ecological momentary assessment, biosensors, integration of multimodal data), study design to allow accurate assessment of clinical trial outcomes and analysis of complex designs including latent variable models. At the end of this course, students will understand considerations for outcomes research, appropriate study design to support that research and interpretation of outcomes data.	3
	Advanced Data Science for Neuroscience: Advanced data science for neuroscience will cover the fundamental principles of machine learning (e.g. data preparation for machine-learning algorithms, bias-variance trade-off, cross-validation to avoid overfitting, etc.), application of data mining algorithms (e.g. ridge/lasso regression, random forests, gradient boosting, etc.), coding for data preparation and implementation of data mining algorithms (e.g. R and/or Python coding) and interpretation of data mining algorithms (e.g. assessing discrimination, variable importance and Shapely scores, partial dependence plots etc.).	3
	Applied Behavioral Genomics: This course will introduce students to topics related to genetics and its role in behavior and psychiatric disorders. Topics of discussion will include heritability, gene x environment interactions, genetic variation, epigenetics, principles of evolution, methods in the study of genomics, genetic basis of psychiatric disorders, and principles of bioinformatics. Classes will include lectures from experts in the field followed by journal club discussions of recent papers on the topics.	3