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EMORY COLLEGE

Neuroscience and Behavioral Biology Program

STUDENT HANDBOOK

2019-2020

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NOTES

Neuroscience and Behavioral Biology Program

1462 Clifton Road, Suite 304

FAX: 404-727-7471

www.nbb.emory.edu**Paul R. Lennard**

Director

paul.lennard@emory.edu

Phone: 404-727-4958

Kristen Frenzel

Associate Director

kfrenze@emory.edu

Phone: 404-727-1317

Michael Crutcher

Director of Undergraduate Studies

mcrutch@emory.edu

Phone: 404-727-5011

Leah Anderson Roesch

Director of Undergraduate Research

leah.roesch@emory.edu

Phone: 404-727-4589

Alan Weinstein

Academic Department Administrator

alan.weinstein@emory.edu

Phone: 404-727-4929

Nadia G. Brown- Ware

Academic Degree Program Coordinator

nadia.brown@emory.edu

Phone: 404-727-4958

*Please call the office if you have additional questions.

Useful Emory Resources for Students

<http://college.emory.edu/oue/student-support>

(Student Academic Support)

EPASS

Academic Coaches

ESL Program

Information for Students with Disabilities

Academic Fellows

Writing Center

Tutor Employment

Pre-Health Advising

<http://prehealth.emory.edu>

Emory helpline - **404.727.4357 (HELP)**

Counseling and Psychological Services

<http://studenthealth.emory.edu/cs/>

Or

[Counseling and Psychological Services](#)

[Student Health Services](#) (and campus medical professionals)

[Office of Spiritual & Religious Life](#)

(when a staff member is acting in the role of Clergy).

Sexual Misconduct Resources

<http://sexualmisconductresources.emory.edu>

Office of Accessibility

Access, Disability Services and Resources

<http://accessibility.emory.edu>

Advisor _____ Department _____
Office _____ Telephone _____
E-mail _____

Please bring this booklet with you when you meet with your advisor.

Each NBB major is assigned an academic advisor. **It is imperative that you meet with that advisor** at least once a semester to discuss courses that meet the requirements of the major. In addition, students should talk to their advisors about future career plans; e.g., graduate school, medical school, etc., as there may be additional courses they should take for entrance to graduate school. Advisors will be available during pre-registration and their office hours. However, advisors will often have more time to spend with students at times other than pre-registration. We hope that students will take advantage of these times in scheduling appointments with their advisors.

In addition to these courses, Emory College's General Requirements must be met.

If your advisor is not a good fit for you, then be aware that you can change your advisor at any time.

NBB Checklist of Courses

Neuroscience & Behavioral Biology B.S. Program

Student _____ Expected Graduation Date _____
Post-Graduation Plans _____

Course	Please Check	Semester Course	Notes
BIOL 141 w/Lab	___	_____	_____
BIOL 142 w/Lab	___	_____	_____
1 yr of CHEM w/ Lab	___	_____	_____
Quantitative*	___	_____	_____
QTM 100	___	_____	_____
NBB 201/Anth 200	___	_____	_____
NBB 301/Biol 360	___	_____	_____
NBB 302/Psyc 353	___	_____	_____
NBB 401W or 402W	___	_____	_____
Elective 1	___	_____	_____
Elective 2	___	_____	_____
Elective 3	___	_____	_____
Elective 4	___	_____	_____
Elective 5	___	_____	_____
Elective 6	___	_____	_____
Elective 7	___	_____	_____

*Math 111, 112, 112z, 116, 211, 212, 221, 275, Bio 212, CS 170 or QTM 200

*Contact NBB with any questions

Overview

The interdepartmental program in Neuroscience and Behavioral Biology offers a Bachelor of Science. Our program combines the expertise, enthusiasm and commitment of a large and diverse group of faculty from many departments including Anthropology, Biology, Chemistry, and Psychology. Using the concepts of evolution as a unifying theme, the major represents a unique interdisciplinary synthesis of the fields of Neuroscience and Behavior and provides a breadth and focus not found in traditional Biology, Psychology, Biopsychology, Neuroscience or Anthropology programs. NBB has developed strong partnerships with: the Emory University Comprehensive Neuroscience Initiative; The Emory College Center for Mind, Brain and Culture; The Center for Neuropolicy; The Emory-Tibet Science Initiative; and The Emory Graduate Program in Neuroscience. NBB has formal teaching/internship programs established with the Neurology Department and with the Department of Emergency Medicine. NBB also has established a semester study abroad exchange program with the University of St. Andrews in Scotland.

NBB Major Requirements

The major requires a minimum of twelve courses (thirty-four semester hours) in the field of Neuroscience and Behavioral Biology. Majors must take the sequence of four core courses, which include NBB 201, NBB 301, NBB 302, and NBB 401/SW or NBB 402. In addition to the core courses, a minimum of seven NBB approved electives are needed.

All majors are also required to take the following introductory foundation courses: QTM 100; Biology 141 with Lab and Biology 142 with Lab; 1 year of Chemistry with lab; and one quantitative course (Math 111, 112, 112z, 116, 211, 212, 221, 275, Bio 212, CS 170 or QTM 200). Students are encouraged to complete these courses by the end of their sophomore year.

Students with particular interests, e.g. premedical, graduate school in biological anthropology, biopsychology, neuropsychology, ethology, or neuroscience, may be advised to take additional courses in anthropology, biology, chemistry, math, physics, and psychology. The courses would be chosen by the student and advisor to fit the student's plan.

Honors Program

Qualified seniors are encouraged to participate in the Neuroscience and Behavioral Biology Honors Program. Admission to the Honors Program depends upon criteria established by the college (minimum 3.5 GPA) and sponsorship by a Faculty research advisor. NBB honors students must complete two semesters of Honors research NBB 495A (4 hrs) & NBB 495BW (4hrs) and successfully complete at least one graduate-level course of 2 credits or more.

STUDY ABROAD OPPORTUNITIES – CONTACT NADIA BROWN-WARE (nadia.brown@emory.edu) FOR MORE INFORMATION

UNIVERSITY OF ST. ANDREWS, SCOTLAND

Brain StEm (Spring and Fall Courses)

The Emory Neuroscience and Behavioral Biology Program (NBB) and the University of St. Andrews Schools of Biology and Psychology have established a unique type of study abroad exchange program. The “Brain StEm” Program, represents the creation of a true “sister school” relationship between the extremely strong neuroscience and behavioral sciences programs at the two institutions. Emory’s NBB Program is one of the largest undergraduate programs in North America with over 500 majors and eighty-five faculty members. The neuroscience program at University of St Andrews is a joint undertaking of the Schools of Biology and Psychology which both recently received top ratings from RAE, the national audit of research quality in UK university departments. What does all this mean for the students? By implementing “The Institute of Behavioral and Neural Sciences”, rather than an a la carte approach to selecting courses, a coherent program of pre-approved courses has been put into place. Overall curriculum and appropriate courses have been evaluated and selected by the faculty of each institution and faculty advisors are in place at Emory and St. Andrews to assist the students participating in “Brain StEm”. Here at Emory this translates into a study abroad program that provides pre-approved equivalents for: NBB **301, 302 & 401**, required core courses; QTM 100, the statistics & experimental design course which is a prerequisite for undergraduate research; and thirty-two University of St. Andrew courses which can serve as electives for the NBB major!

MPhil IN NBB (Masters of Philosophy in Neuroscience- 1 year)

Building upon the successful Brain StEm program, Emory and St. Andrews are offering a 4+1 BS (Emory) MPhil (St. Andrews) research-based NBB degree combination. To qualify, Emory NBB majors must have a 3.5 GPA and have an invitation from one of the St. Andrews participating professors, or graduate from Emory with honors in NBB. The first year of the normally two-year MPhil program will be waived, allowing qualifying NBB BS graduates to complete their Master’s degree in one year. Contact the NBB office for further information.

Emory Melbourne University Science Experience (E.M.U.S.E)

A new program that has been designed specifically for Emory Biology, Chemistry, and NBB students in their junior and senior year who are interested in spending a semester abroad in Melbourne, Australia. As a student in the program, you will undertake a research-focused study abroad experience while also taking biology, neuroscience, or chemistry courses offered Fall and Spring semesters: Semester 1 runs from early February to mid-June; Semester 2 runs from early July to Mid-November. This program is run in conjunction with the Department of Anatomy and Cell Biology and the Department of Chemistry at the University of Melbourne. For more information please contact the NBB office.

NBB Study Abroad in Paris (Summer)

Neuroscience and Behavioral Biology program is offering a unique opportunity to study in Paris for a 5-week program that will connect the rich history of French neurology with contemporary neuroscience research. Students will couple in-class discussions with a variety of extracurricular outings to locations that illustrate France’s role in early Neurology (e.g. Hôpital de la Salpêtrière) and its current research interests (e.g. Institut Curie or La Cité des Sciences). Please note: NO FRENCH LANGUAGE PROFICIENCY IS REQUIRED.

STUDENT ORGANIZATIONS

Nu Rho Psi

The current members of Nu Rho Psi shared that recognition as an honor society at commencement was important. Now that our local chapter is officially part of the national chapter, our members can wear honor cords at commencement. The purpose is to encourage professional interest and excellence in scholarship; award recognition to students who achieved such excellence in scholarship; advance discipline of neuroscience; encourage intellectual and social interaction between students and faculty; promote career development in neuroscience and related fields; increase public awareness of neuroscience and its benefits for the individual and society; and encourage service to the community.

ENA

Emory Neuroscience Association is an undergraduate organization dedicated to promoting the Neuroscience & Behavioral Biology major and fostering interest in neuroscience. The organization achieves these goals by hosting regular events that provide students with opportunities to meet NBB faculty and understand ongoing neuroscience research. Furthermore, the organization provides peer support and mentorship to facilitate undergraduate students' academic and career aspirations. Interested students should contact any of the current officers for more information regarding membership and upcoming events. Membership is open to undergraduate students of any academic background.

For more information contact Alan Weinstein
(alan.weinstein@emory.edu) or visit the NBB website
(www.nbb.emory.edu)

Course Descriptions, NBB Core Courses

NBB 201. Foundations of Behavior (Same as ANT 200)

Fall. Prerequisite: Biology 141. This course presents an overview of behavioral biology and evolution. The biological bases of behavior are examined in light of evolutionary processes and ecological pressures, emphasizing human and primate examples. (General Education Requirements: Area II B2 - Natural Sciences/Non-Lab)

NBB 301. Introduction to Neurobiology (Same as BIOL 360)

Fall and Spring. Prerequisites: Biology 141, 1 year of Chemistry with lab. An introduction to cellular and integrative neurobiology. Topics include the electrochemical and biophysical mechanisms for neuronal signaling and synaptic transmission and the neural bases of behavior and perception.

NBB 302. Behavioral Neuroscience (Same as PSYCH 353)

Fall and Spring. The goal of this course is to present an integrated coverage of work at the intersection of animal behavior, evolution, and cellular/systems neuroscience.

The course surveys the major areas of behavioral neuroscience. NBB 301 is a prerequisite/co-requisite.

NBB 401W. Perspectives in Neurobiology and Behavior

Fall. Prerequisite: NBB 201, NBB 301, and NBB 302 or by permission of instructor. A writing-intensive Senior Seminar utilizing the primary literature to examine current issues, trends, and controversies in the field of Neuroscience and Behavioral Biology. **Fulfills a General Education Writing Requirement** (Post-Freshman Writing and Advanced Seminar)

NBB 402W, Global Neuro and Behavior

Summer. Prerequisite: NBB 201, NBB 301, and NBB 302 or by permission of instructor. An intensive Senior Seminar utilizing the primary literature to examine current issues, trends, and controversies in the field of Neuroscience and Behavioral Biology. **Fulfills NBB 401W requirement and a General Education Writing Requirement**

Research Experience Courses – for NBB Elective Credit

NBB 495A. Honors Research

Fall, Spring. Only open to senior NBB majors enrolled in the NBB/College Honors Program. For every credit hour attempted, students spend a minimum of three hours working on the research project under the direction of their faculty research mentor. They also attend scheduled meetings to present progress reports of their ongoing research, discuss how to write proposals and papers, and give oral presentations.

Pre-Reqs: Permission of instructor and QTM 100. Cannot be taken concurrently with NBB 495B(W) or NBB 499R. May not receive credit for NBB 495A if also taking NBB 497W or NBB 498R under the direction of the same faculty mentor during the same semester. Eight hours of NBB 495A, 495B(W), or 499R are accepted as a total of two electives toward the NBB major.

NBB 495B (W). Honors Research

Fall, Spring. Open only to senior NBB majors enrolled in the NBB/College Honor Program. For every credit hour attempted, students spend a minimum of three hours working on the research project under the direction of their faculty research mentor. Students also attend scheduled meetings to present progress reports, discuss how to write proposals, papers, and give oral presentations. Successful completion of the written thesis is a fundamental component of the course.

Pre-Reqs: Permission of instructor; QTM 100; NBB 495A Cannot be taken concurrently with 499R. May not receive credit for NBB 495B(W) if also taking NBB 497W or NBB 498R under the direction of the same faculty mentor during the same semester. Eight hours of NBB 495A, 495B(W), or 499R are accepted as a total of two electives toward the NBB major.

NBB 499R. Undergraduate Research,

Fall, Spring. Credit is variable up to four hours, but 3-4 hours is strongly recommended. For every credit hour attempted, students spend a minimum of three hours working on the research project under the direction of their faculty research mentor. Students also attend meetings to present progress reports of their ongoing research, discuss how to write proposals, papers, and give oral presentations. Eight hours of NBB 495A, 495B(W), or 499R are accepted as a total of two electives toward the NBB major.

Pre-Reqs: Permission of instructor. For enrollment in a second semester, QTM 100 is required. Cannot be taken concurrently with NBB 495A or 495B(W). May not receive credit for NBB 497W or NBB 498R under the direction of the same faculty mentor during the same semester.

Carol Worthman (Anthropology)

worthman@emory.edu, Professor

Biological anthropology, human reproduction, human development, developmental epidemiology, biocultural and life history theory

Paul Wolpe (Ethics)

pwolpe@emory.edu, Asa Griggs Candler Professor of Bioethics

Neuroethics, which, examines the ethical implications of neuroscience.

David W. Wright (Emergency Medicine)

david.wright@emory.edu, Associate Professor-TT, Co-Director EMR

The preclinical and clinical assessment of neuroprotectants as agents to enhance neuroplasticity and neurorecovery for traumatic brain injury (TBI) and stroke. Examining the role of exogenous progesterone and pregnenolone in the post injury/recovery phase of TBI.

Robert Wyttenbach (Neuroscience and Behavioral Biology)

rwytten@emory.edu, Senior Lecturer

My research interest is insect hearing, primarily applying psychophysical methods. The main focus of my current activity is in developing teaching materials.

Larry J. Young (Psychiatry)

lyoun03@emory.edu, Professor

Molecular mechanisms of neuropeptide regulation of social behavior. The neuropeptides oxytocin (OT) and vasopressin (AVP) are involved in the regulation of social behaviors in mammals.

* For updated information, confirm with faculty.

Sam Sober (Biology)

samuel.j.sober@emory.edu, Assistant Professor

Relationship between neural activity, muscular activation, and task performance by investigating singing behavior in finches.

Amanda Starnes (Biology)

amanda.starnes@emory.edu, Senior Lecturer

Veterinary medicine

Donald G. Stein (Emergency Med)

donald.stein@emory.edu, Professor

Develop a safe and effective treatment for traumatic brain injury (TBI) and stroke.

Dietrich Stout (Anthropology)

dwestout@emory.edu, Assistant Professor

Specializes in the evolution of brain and cognition, Paleolithic archaeology, lithic technology, experimental archaeology, and cognitive neuroscience.

Irwin Waldman (Psychology)

psyiw@emory.edu, Professor

Developmental psychopathology research and methods.

Elaine Walker (Psychology)

elaine.walker@emory.edu, Professor

The precursors and neurodevelopmental aspects of psychopathology, especially schizophrenia.

Kim Wallen (Psychology)

kim@emory.edu, Professor

Role of hormones in primate sexual behavior and gender development; the interaction between social context and hormonal factors on development and expression.

David Weinschenker (Human Genetics)

dweinschenker@genetics.emory.edu, Director, Neuroscience Graduate Program

Focus on the catecholamine neurotransmitters norepinephrine and dopamine using a combination of genetics, behavior, pharmacology, neurochemistry, optogenetics, and chemogenetics in rodents to better understand the neurobiology underlying normal brain function.

Jay Weiss (Psychiatry & Behavioral Science)

jweis01@emory.edu, Professor

Neuroimmunology; interaction of immune system with brain and behavior.

Whitney Wharton (Neurology)

w.wharton@emory.edu, Assistant Professor

Cognitive neuroscientist specializing in Alzheimer's disease

Course Descriptions, Electives: NBB

NBB 221. Research Methods in Neuroscience (Not currently offered)

The focus will be to educate students in the scientific method: generating testable hypotheses, sampling randomization and control techniques. Students will learn the basic statistical vocabulary necessary to read and interpret scientific articles in the field.

NBB 270. Special Topics in NBB

Variable course that changes depending on the semester. Check most recent course atlas for current Special Topics.

NBB 299. Explore NBB Research

Spring. 3-credit NBB elective. This class is designed for first- and second-year students who are looking for a broad understanding of the breadth of what NBB actually is. This class would be excellent preparation for students who have recently joined a research lab/team or who are considering joining a research lab/team. We will explore practical questions about research with discussions, cases and guest speakers. Grading will be based on class participation, short investigative papers, and your professional portfolio.

NBB 300. The Musical Brain (Same as Music 309)

This course examines the subjective experience and neural substrates of music perception and performance. Each week the class participates in a dialog between musicians and neuroscientists that examines both the experiential and mechanistic approach to music by asking questions such as "What makes something musical and how are the complex sounds of music processed by the brain?" The relationships of music to language, emotion and memory will be examined in detail. Theories of motor learning will be discussed and applied to musical performance. The course explores the development of the musical mind from infancy to adulthood and asks the question, "How are the brains of composers, conductors, and performers different?" Evidence of the efficacy of music therapy and the impact of music on mental health are evaluated. Finally, the evolution of musicality in animals and humans is examined.
Prerequisites: None

NBB 317. Human Social Neuroscience (Same as Anthropology 317)

Neurobiological substrates supporting human social cognition and behavior. Review and synthesis of relevant research in neuropsychology, psychiatry, neuroimaging, and experimental animal research

NBB 319. Anthropology of Fatherhood (Same as ANT 319)

This course will explore fatherhood from an anthropological perspective. It will describe an attempt to explain variation in male parental care across species, across cultures and across individuals within a culture. Emphasis will be placed on hormonal and neurobiological foundations of paternal care, evolutionary theory, ethnography and developmental psychology.

NBB 321: Behavioral Neuroendocrinology of Sex (Same as PSYC 321)

This course examines the role hormones, particularly steroid hormones, play in the development and activation of reproductive behaviors in animals and humans. In addition, the role of hormones in the development of sex differences in the brain and behavior will be explored.

NBB 361 (WR). Neurophysiology Laboratory

Prerequisite: NBB 301 (BIOL 360)

This lab uses intracellular and extracellular techniques to examine sensory and motor circuits, synaptic plasticity, and ionic bases of potentials from invertebrates. Part of the semester is devoted to student-designed projects. Special attention is given to scientific writing and presentation of data.

Taught every spring; 2 hours lecture and 3 hours lab. 4 credits.

NBB 370. Variable topics, of special interest, in the field of Neuroscience and Behavioral Biology.

NBB 404 (WR). Roots of Modern Neuroscience Seminar

Using a combination of literature, film, and laboratory demonstrations, this course will trace contemporary issues in neuroscience from their origins in the 18th and 19th centuries to new frontiers. Among the topics treated will be localization vs. holism, visionaries and their models, conflicts and controversies between scientists and their students, and philosophical concepts vs. instrument-based inquiry. Some examples of the readings are papers by Santiago Ramon y Cajal, Hermann von Helmholtz, Sir Charles Sherrington, and Sigmund Freud; the novels *Frankenstein* and *Neuromancer*; and the film *Pi*.

NBB 414. Brain and Cognitive Development (Same as PSYC 414)

The course examines developmental changes in brain function and organization linked to different aspects of sensory, language, and non-language cognitive processes during the first three years of life.

NBB 424. Medical Neuropathology

The primary focus of this course will be to provide an overview of the organic foundations of selected neurological disorders. The first part of the course will be an introduction to the functional neuroanatomy of the “normal” brain. The second part of the course will introduce some clinical aspects related to damage/degeneration in these areas; such as stroke, ischemia, Parkinson’s, Alzheimer’s, Epilepsy, amnesias/dementias paying attention to traditional neuropsychological assessment/tests that differentiate among them.

NBB 425. Brain Imaging (Same as PSYC 425)

This course will focus on the application of imaging technology to the study of brain function and anatomy. We will cover the history of the development of brain imaging methods, the technical basis for various imaging methods, and learn to apply imaging methods in the realms of both basic and clinical science.

NBB 426. Neuropharmacology & Placebo (Same as PSYC426)

Prerequisites: Biology 141 and 142, Chemistry 141 and 142. Taken after introductory biology and chemistry courses. The focus will be drug development, namely the process by which a condition to be treated is identified and then medications are developed, tested, and finally distributed to patients.

NBB 460. Building Brains (Same as BIOL 460)

Prerequisites: Bio 141/142. Explore the current understanding of the mechanisms that regulate development of the nervous system. Topics covered include neurogenesis, axon guidance, programmed cell death, and synapse formation.

NBB 470/471. Special Topics in NBB

Variable topics of special interest in the field of Neuroscience & Behavioral Biology. Check most recent Course Atlas for current NBB 470 courses. 471 is available during the summer Paris Program/Study Abroad.

NBB 481. Neuroeconomics (Same as ECON 481)

Prerequisites: *Economics 201 and 212, or NBB 301 and 302, or consent of instructor.* This course is designed to provide students with an introduction to the field of neuroeconomics. Upon completion of the course, students will have a basic understanding of the tools used to study the neurobiology of decision making.

NBB 490. Clinical Neurology Study

Students will have an opportunity to correlate experience with actual patients with the science behind the diagnosis. During their time in the clinics, students will act as a “patient assistant,” helping patients who may have partial paralysis or loss of sensation. They will learn the basics of the Health Insurance Portability and Accountability Act (HIPAA) and will record patients’ history and neurological findings in compliance with HIPAA while observing real-life patient examinations. *Prerequisites: NBB 301 and Instructor Permission*

Hillary R. Rodman (Psychology)

hrrodman@rmy.emory.edu, Associate Professor

The organization, development, and plasticity of visual cortex, particularly “extra-striate” areas.

Leah Anderson Roesch (Neuroscience and Behavioral Biology)

leah.roesch@emory.edu, Lecturer

Molecular basis of neurodegenerative disease and science education.

Karen S. Rommelfanger (Neuroethics)

krommel@emory.edu, Assistant Professor

Current research explores the nature and utility of placebo using Psychogenic Movement Disorders as a therapeutic model.

Deboleena Roy (Neuroscience and Behavioral Biology, Women’s Studies)

droy2@emory.edu, Associate Professor

Primary research emphasis on bridging theoretical critiques of science and technology with transformations in the processes of scientific knowledge production with feminist attempts to return to matters of the biological body.

Mar Sanchez (Psychiatry)

sanchez@rmy.emory.edu, Associate Professor

Effects of early adverse experiences on development of nonhuman primates, focusing on emotion regulation, stress reactivity and relaxed neurobiological substrates.

Iain Shepherd (Biology)

ishephe@emory.edu, Associate Professor

Molecular and genetic mechanisms that are involved in the development of a functional nervous system. Development of the vertebrate enteric nervous (ENS).

Bradd Shore (Anthropology)

antbs@emory.edu, Professor

Symbolic and psychological anthropologist of Oceania, Polynesian and U.S. rituals.

Yoland Smith (Yerkes)

Ysmith01@emory.edu, Professor

Elucidate various aspects of the synaptic circuitry of the primate basal ganglia.

Kate O'Toole (Biology)

kate.k.otoole@emory.edu, Lecturer

My own research training has focused on understanding the role of transmembrane proteins in cellular functions.

Chikako Ozawa-de Silva (Anthropology)

cozawad@emory.edu, Associate Professor

Medical anthropology, anthropology of body and mind, discourse of selfhood, therapies and healing practices, suicide, psychiatric disorders and meditation, religious practices.

Nelson M. Oyesiku (SOM: Neurosurgery)

noyesik@emory.edu, Professor

Premier tertiary neurosurgical care for patients with pituitary tumors.

Rohan Palmer (Psychology)

rohan.palmer@emory.edu, Assistant Professor

As principal investigator of NIAA sponsored K01, I am currently engaged in whole genome of alcohol use disorder and comorbid substance use problems.

Lisa Parr (Yerkes)

lparr@emory.edu, Assistant Research Professor

Clarify the similarities and the differences in the way in which chimpanzees view the social and emotional signals that help them to mediate their social environment.

Todd Preuss (Pathology Yerkes)

tpreuss@rmy.emory.edu, Associate Research Professor

Fundamental research on the human brain; identify the evolutionary specializations of the human brain, which we do by comparing humans to chimpanzees and to other nonhuman primates.

Astrid Prinz (Biology)

astrid.prinz@emory.edu, Associate Professor

Computational and experimental methods to study pattern generation and homeostatic regulation in small neural networks.

James Rilling (Anthropology)

jrilling@emory.edu, Professor

Neural bases of human behavior, evolution of social behavior, comparative primate neurobiology, human brain evolution.

Mark Risjord (Philosophy)

mrjsjor@emory.edu, Professor

The relationship between scientific judgment and moral or political evaluation in the philosophy of science.

NBB Courses College Credit Only

NBB 120. From Botox to Behavior

For non-science majors. No NBB credit. This course satisfies the General Education requirement for SNT+Lab course. Using active-learning methods and real-world examples, this course is designed to provide a fuller understanding of how the brain works and how neuronal activity underlies complex human behaviors. We will explore topics like: drug overdoses, Botox injections, sensory systems, emotions and memories.

NBB 190. Freshman Seminars.

Variable topics of special interest in the field of Neuroscience and Behavioral Biology. Any of these NBB 190 Courses will satisfy the General Education Freshman Seminar requirement.

NBB 301L / BIOL 360L

This course will explore topics in cellular and small network neuroscience by performing virtual electrophysiology experiments on the computer. The content of the course matches material covered in Biology 360/NBB 301 and will help students understand neurons and neuronal networks in greater depth. This course should be taken concurrently with, or after Biology 360/NBB 301.

NBB 399R. Intro to Mentored Research

Fall, Spring. Permission only. Credit is variable up to four hours maximum. Appropriate for students during their first semester(s) of research work, prior to NBB499. For every credit hour attempted, registrants spend a minimum of three hours working on the research project under the direction of their faculty research mentor to learn new techniques and prepare for independent projects. Grading is based on completion of the criteria that the student and mentor set at the beginning of each semester.

NBB 482R. Frontiers in Neuroscience

Fall, Spring; 1hour credit; Students attend cutting edge Neuroscience talks by researchers. Students will attend seminars and take notes during them. NBB 301 is a prerequisite. (Note: Frontiers in Neuroscience does not fulfill the elective requirement for NBB majors, is only S/U graded, and is a 1-credit course.)

NBB 497W. Supervised Writing

Fall, Spring, Summer. "4" hour credit. Independent, faculty-mentored research and writing, with major writing assignment(s) accounting for at least 60% of the grade. For every credit hour attempted, registrants spend a minimum of three hours working under the direction of their faculty research mentor. Is not an elective towards the major.

Pre-Reqs: Permission of instructor. May not receive credit for NBB 495A, 495B(W), 498R, 499R under the direction of the same faculty mentor during the same semester.

NBB 498R. Supervised Reading

Fall, Spring, Summer. 1-4 hours credit. Independent, faculty-mentored research; designed as a prelude to conducting laboratory research under the same mentor. For every credit hour attempted, registrants spend a minimum of three hours working under the direction of their faculty research mentor.

Pre-Reqs: permission of instructor; cannot be taken concurrently with NBB 497WR, 495A, or 499R. NBB 498R does not count as an NBB elective.

NBB 499R Undergraduate Research

This course is designed for students who are more-or-less 'up and running' and gaining independence on a specific research project. Students are expected to be familiar with the project and techniques before the semester starts so they will be able to ramp up productivity and independence quickly during the semester. NBB499 may be taken for 3-4 credits per semester.

Course Descriptions, Electives: Anthropology**ANT 210. Human Biology: A Life Cycle Approach**

Human biology from conception to senescence, in an evolutionary and cross-cultural context, emphasizing neural and neuroendocrine processes underlying behavior and reproduction. Conception, fetal development, birth, infant growth, puberty, pregnancy, adult sexuality and aging.

ANT 302. Primate Behavior and Ecology

This course surveys the social behavior, behavioral ecology, and adaptations of nonhuman primate species, the extant prosimians, monkeys, and apes.

ANT 305. The Human Brain

Prerequisite: Anthropology 201 or Anthropology 210 or Biology 142. This course introduces principles and findings relevant to the understanding of behavior, especially social behavior. The phylogenetic range of the course will be as wide as is appropriate to elucidate a given principle, but the focus will be on the human species. The approach will be to bring evolutionary, physiological, and developmental principles to bear on a given question about behavior.

ANT 306. Primate Mating Strategies

Prerequisite: Anthropology 302. Comparative study of primate mating strategies and sexual behavior.

ANT 307. Human Evolution

Integrates data and theory from genetics, geology, and paleoanthropological evidence. Opposing theories regarding the interpretation of data will be the focus of evaluation.

ANT 310. Communication in Primates

This course examines human as well as non-human primate communication systems from an evolutionary perspective. Topics covered include signal structure and function, information content of signals, honesty, deceit, and the evolution of language in humans.

ANT 311. Nutritional Anthropology

Introduction to the evolution, diversity, and social significance of human diet and nutrition.

ANT 316. Evolution of Human Brain and Mind

Evolutionary modifications of the human brain as evidenced by the fossil and archeological record; by comparisons between human and non-human brains with respect to anatomy, function, and development; and by comparisons between human and non-human cognition. Special emphasis will be placed on the evolved neural bases of human language, cooperation, morality, social cognition, and pair bonding.

ANT 317. Human Social Neuroscience

Neurobiological substrates supporting human social cognition and behavior. Review and synthesis of relevant research in neuropsychology, psychiatry, neuroimaging and experimental animal research (NBB 317).

ANT 319. Anthropology of Fatherhood (Same as NBB 319)

This course will explore fatherhood from an anthropological perspective. It will describe an attempt to explain variation in male parental care across species, across cultures and across individuals within a culture. Emphasis will be placed on hormonal and neurobiological foundations of paternal care, evolutionary theory, ethnography and developmental psychology.

Anthony (Tony) Martin (Environmental Studies)

geoam@emory.edu, Professor of Practice

Research interest is Ichthyology, the study of plant and animal traces, such as tracks, trails, burrows, nests, and feces. Tracks and tracking of modern terrestrial vertebrates.

Jennifer Mascaro (SOM: Wesley Woods)

jmascar@emory.edu Asst. Professor

Variation in, and plasticity of, human social cognition, and the biology of interconnectedness. Explore how behavioral, cultural, neural, hormonal, and genetic factors modulate prosocial emotions and behaviors.

Robert N. McCauley (Philosophy)

philmnm@emory.edu, Professor

Models of cross-scientific relations and the interfaces of cognitive psychology, connectionism, and neuroscience; psychological (especially cognitive) foundations of cultural systems that seem to conform to rules; naturalistic accounts of consciousness.

Vasiliki Michopoulos (Psychiatry)

vmichop@emory.edu, Assistant Professor

Psychosocial stress exposure (including trauma) across the lifespan adversely affects behavior and physiology using a translational neuroscience approach across non-human primates and humans in a sex-specific manner.

E. Christopher Muly (SOM: Psychiatry/Yerkes)

ecmuly@rmy.emory.edu, Assistant Professor/ Affiliate Scientist

Neuroanatomy of dopaminergic systems in primates

Darryl Neill (Psychology)

dneill@emory.edu, Professor

Mammalian brain systems which are the neural substrates of the psychological/behavioral processes of mood, motivation, reward, and reinforcement.

Ilya Nemenman. (Physics)

iya.nemenman@emory.edu, Associate Professor

Theoretical physics and machine learning methods to develop coarse-grained models of information processing in systems biology.

Seth Davin Norrholm (Psychiatry)

snorrho@emory.edu, assistant professor

"Bench-to-bedside" clinical research methods to inform therapeutic interventions for posttraumatic stress disorder (PTSD) and the disorders with which it is co-morbid.

Lynne Nygaard (Psychology)

lnygaard@emory.edu, Professor

Research interests include the perception of speech and other auditory events.

Laura Otis (English)

lotis@emory.edu, Professor

Dr. Otis compares the ways that neuroscientists and literary writers conceive of memory, identity, and visual and auditory perception.

Melvin Konner (Anthropology)

antmk@emory.edu, Professor

Human nature and child development in evolutionary and cross-cultural perspective.

Michelle Lampl (Anthropology)

mlampl@emory.edu, Associate Professor

Biological mechanisms underlying normal human growth and development, maternal child health, nutrition.

Paul Lennard, Director (Neuroscience and Behavioral Biology)

prlenna@emory.edu, Associate Professor

Pathogenesis of primary myopathies, progression of degenerative neuromuscular diseases.

Allan Levey (SOM: Neurology)

Allan.levey@emory.edu, Professor

Investigating Alzheimer's and Parkinson's diseases.

Richard Levinson (School of Public Health)

rlevins@sph.emory.edu, Professor

Social determinants of health risk behavior; prevention of HIV/AIDS; and access to and utilization of health services.

Scott Lilienfeld (Psychology)

slilien@emory.edu, Professor

Biological factors in the etiology of personality disorders, behavior-genetic approaches to psychopathology, and pseudoscientific practices in psychology, neuroscience, and medicine.

Robert Liu (Biology)

robert.liu@emory.edu, Associate Professor

Computational neuroethology-exploring the elegant hypothesis in neuroscience that the statistics and regularities of the sensory world are closely reflected in the coding strategies used by neurons.

David Lynn (Chemistry)

david.lynn@emory.edu, Professor/Chair

Research focuses on the processes of molecular self-assembly and how chemical information can be stored and translated in molecular entities

Donna Maney (Psychology)

dmaney@emory.edu, Professor

Neural circuitry underlying communication behavior. How animals perceive, process, and respond appropriately to social signals.

Joe Manns (Psychology)

jmanns@emory.edu, Associate Professor

Focuses on electrophysiological recordings in rats performing memory tasks and has addressed how activity in the hippocampus allows us to encode and retrieve specific information about individual items.

Pat Marsteller (Biology)

pmars@emory.edu, Director/ECCSE

Science teaching and pedagogy in K-12, undergraduate and graduate programs.

ANT 321. Anthropology of Human Reproduction

This course examines biological, cultural and behavioral determinants of human reproduction

ANT 323. Sex Differences: Biological Bases

Examination of the biological bases of sex differences and their development

ANT 333. Disease & Human Behavior

Biological and cultural adaptations to disease, the role of specific diseases in evolution, social epidemiological patterns related to culture, contemporary issues in disease control, and economic development. Considers a variety of diseases including malaria, tuberculosis, AIDS, diabetes, and depression.

ANT 334. Evolutionary medicine

Survey of the application of Darwinian evolutionary principles to human vulnerability to a variety of disease (e. g. cancer, depression, atherosclerosis). The evolution of defenses against disease is reviewed.

ANT 338/338W. Global Health: Biosocial Model

This course surveys the global landscape of challenges to physical and mental health that confront us today, and traces the emergence of biosocial approaches to both explaining and tackling these challenges.

ANT 339. Defining Health: Biocultural Perspective

Evolutionary perspectives provide a background for understanding the limitation imposed by biomedical frameworks and our understanding of human biological variability. Flexibility in gene expression and human phenotypes reflect the importance of biocultural influences on health.

ANT 385. Various Topics *Requires NBB approval.

Rotating topics in Anthropology. Please refer to the most recent atlas for the most recent course offerings from Anthropology.

ANT 450W: The Evolution of Childhood.

This course will cover the evolutionary and anatomical foundations of psychological, especially social and emotional, development, as well as comparative socialization and cross-cultural varieties of enculturation.

Course Descriptions, Electives: Biology**BIOL 241/341-SAF. Evolutionary Biology**

A study of the factors that cause genetic change and of the evolutionary consequences of such changes. Topics include population genetics, adaptation and natural selection, evolution of genes, proteins and genomes, sexual selection, kin selection, speciation, and diversification of taxa. Emphasis on molecular, genetic, ecological, and evolutionary factors related to variation and adaptation to environment, and constraints on adaptation of human physiology. *Prerequisites:* Biology 141 and 142. Also taught as a summer study abroad program in conjunction with Biology 349-SAF (Ecology of Invasions).

BIOL 320. Animal Behavior (Same as Psychology 320)

Provides an overview of major research areas in the field of animal behavior. The behavior of animals will be analyzed from an evolutionary and comparative perspective. Some topics included are orientation and migration, genetic and environmental influences on behavior, population regulation, courtship and mating strategies, and parental behavior. *Prerequisites:* Biology 141 and 142

BIOL 325. Primate Social Psychology (Same as PSYC 325)

Covers recent progress in the field of primate social behavior. Topics range from aggression and dominance to affiliation, sex, and peaceful coexistence. *Prerequisites:* Biology 141 and 142, *Psychology 320 is recommended.*

BIOL 336. Human Physiology

A study of human physiology emphasizing integrated body functions. Topics include respiration, circulation, contractility, osmoregulation, endocrinology, and neurophysiology. *Prerequisites:* Biology 141 and 142 *or permission of instructor.*

BIOL 340R_OX. Independent Research and Discovery in Biology

The course is an integrated class with laboratory where research topics will vary each semester. *Prerequisite/Co-requisite:* Biology 142 or Biology 242 and permission of the instructor. All prerequisite classes and laboratories must be completed with a grade of B or higher. (Oxford only)

BIOL 348. Mechanisms of Animal Behavior

A survey of current topics in neural development and neural basis of behavior. Emphasis is on research work that uses a combination of physiological, genetic, cellular, and molecular techniques to understand neural systems and their evolution and development. *Prerequisites:* Biology 141 and 142, Biology 336 or 360, Chemistry 141 and 142, *or permission of instructor.*

BIOL 385 Special Topics in Biology *Requires NBB approval.

A lecture series or special course for advanced students on topics of special biological concern. *Prerequisites:* Biology 141 and 142. See course atlas.

BIOL 402/402W. Neuroscience Live

This seminar covers current topics of neuroscience research. Students will learn how to read and critique research papers and how to write and prepare a research grant proposal; and will also interact in a 'live' format with authors of the research papers. *Prerequisites:* Biology 141 and 142; *Pre- or Co-requisite:* NBB 301 or Biology 360 (Fulfills Writing Requirement).

BIOL 434. Physical Biology (Same as PHYS 434)

This course explores the physical and statistical constraints on strategies used by biological systems, from bacteria to large organisms and to entire populations, to sense external environmental signals, process them, and shape a response.

Robert Hampton (Psychology)

robert.hampton@emory.edu, Assistant Professor

Comparative cognition. Memory monitoring and metacognition in nonhuman primates. Neurobiology of learning, memory, and cognition.

Shawn Hochman (Physiology)

shawn.hochman@emory.edu, Associate Professor

Neuromodulatory motoneurons transmitters (serotonin, dopamine, and nor-adrenaline) modify sensorimotor integration in the mammalian CNS. Uses predominantly electrophysiological approaches to study the role of these transmitters and their dysfunction after spinal cord injury.

Linton Hopkins (Neurology)

lhopkin@emory.edu, Professor Emeritus (retired).

Emery Dreifuss muscular dystrophy; myasthenia gravis; demyelinating neuropathy; ALS

Leonard Howell (Division of Neuroscience-Yerkes)

leonard@rmy.emory.edu, Professor.

Neuropharmacology of abused stimulants and basic neurobiological studies of drug mechanisms as well as medications development to treat stimulant abuse.

Gillian Hue (Neuroscience and Behavioral Biology)

ghue@emory.edu, Lecturer

Circadian rhythms and spinal dopamine; sleep. Research Ethics; development of curricula promoting science and ethical engagement.

Dieter Jaeger, (Biology)

djaeger@emory.edu, Professor

Prolonged depolarizations in Purkinje cells following brief inputs to the granule cell layer. The function of synaptic input in the basal ganglia.

Tanja Jovanovic (SOM: Psychiatry)

tiovano@emory.edu, Assistant Professor

Interactions of traumatic experiences, neurophysiology, neuroendocrinology, and genetics in mental disorders in adults and children in high-risk populations.

Andrew Kazama (Yerkes/Psychology)

akazama@emory.edu, Lecturer

The neurobiological basis of safety signal processing, which is implicated in several anxiety-related neuropsychiatric disorders

Jaffar Khan (SOM:Neurology)

jkhan@emory.edu, Associate Professor.

Engaged in research in medical education, focusing on creative and effective methods for training students, residents, and fellows.

Eugene Emory (Psychology)

ememory@emory.edu, Professor

Prenatal brain, behavior, and cognition; perinatal stress and HPA activation; maternal psychopathology (schizophrenia and depression) and fetal development; fetal brain imaging and neuro-cognitive development.

Arthur W. English (Cell Biology)

art@cellbio.emory.edu, Professor

Investigating the roles played by the neurotrophins BDNF and NT-4/5 in that enhancement, as well as the reformation of synapses at both neuromuscular junctions and spinal motoneurons.

Victor Faundez (Cell Biology)

vfaunde@emory.edu, professor

Microdeletion syndromes, genetic defects of human metal transporters and BLOC-1-dependent trafficking to the synapse.

Jennifer Felger (Psychiatry)

jfelger@emory.edu, Assistant Professor

Studies the effect of inflammatory cytokines on neurotransmitters and neural circuits as they relate to behavioral changes.

Nicholas Fotion (Philosophy)

philnf@emory.edu, Professor

Moral philosophy (metaethics, medical ethics, military ethics), and philosophy of language (speech-act theory, pragmatics).

Kristen Frenzel, Associate Director (Neuroscience and Behavioral Biology)

kfrenze@emory.edu, Senior Lecturer

Mechanisms by which proteins function; renin-angiotensin system, which is a central regulator of blood pressure and electrolyte homeostasis; the role of the testis ACE isoform in fertility; neuregulins.

Harold Gouzoules (Psychology)

psyhg@emory.edu, Professor

Nonhuman primate vocal communication and its biological and evolutionary relationships to cognition and social behavior.

Sarah Gouzoules (International Studies Program)

sgouzou@emory.edu, Associate Dean

Communication systems of nonhuman primates, especially macaque monkeys, and the evolution of social behavior and language.

Claire-Anne Gutekunst (Neurosurgery)

cguteku@emory.edu, Assistant Professor

Neuropathology and neurobiology of Huntington's Disease, molecular neuropathology of neurodegenerative disorders, the role of Hap1 and molecular composition and function of Stigmoid Bodies, neurogenerative therapies for Parkinson's Disease, and neuromodulation therapies for epilepsy.

Stephan Hamann (Psychology)

shamann@emory.edu, Associate Professor.

Explicit and implicit memory in normal and neuropsychological populations (patients with focal hippocampal or amygdala lesions, the elderly, and patients with Alzheimer's disease).

BIOL 440/440S. Animal Communication (Same as PSYC 440S)

Functions, evolution, ecology, and significance of animal communication systems in a wide taxonomic range from insects to primates. *Prerequisites:* Biology 141 and 142 (Fulfills Writing Requirement.)

BIOL 450. Computation Neuroscience

Exploration of single neurons and biological neural networks with computer simulations. Each class consists of an introductory lecture followed by computer tutorials using GENESIS software under UNIX. Specific topics include passive cable theory, compartmental modeling, voltage gated and synaptic conductances, motor pattern generation, and cortical networks. *Prerequisites:* Biology 141 and 142

BIOL 460S. Building Brains (Same as NBB 460S)

Course will explore the current understanding of the mechanisms that regulate development of the nervous system. Topics covered include neurogenesis, axon guidance, programmed cell death, and synapse formation. *Prerequisites:* Biology 141 and 142.

BIOL 475. Biology of the Eye

A course designed for juniors, seniors, and graduate students who are interested in a basic understanding of the eye. This course will review basic principles and state-of-the-art information on ocular anatomy, embryology, biochemistry, physiology, genetics, immunology, microbiology, pharmacology, and pathology. *Prerequisites:* Biology 141 and 142

BIOL 485. Special Topics in Biology

A lecture series or special course designed for advanced students on topics of special biological concern. May be repeated for a total of 8 credit hours when topic varies. *Prerequisites:* Biology 142 and Biology 142L. See current course atlas. This course may be taken for elective credit for the biology major.

Course Descriptions, Electives: Psychology**PSYC 103. Brain & Behavior**

This is a course about the biology of behavior. Special attention is given to sex, eating, drinking, sleeping and waking.

PSYC 209. Perception and Action

Perception of the world through the senses, gathering information about one's surroundings by seeing, hearing, smelling, tasting, touching, and acting.

PSYC 215. Cognition

Theories and research addressing the nature of higher mental processes, including such areas of cognition as categorization, attention, memory, knowledge representation, imagery, Psycholinguistics, and problem solving.

PSYC 222_OX. Clinical Neuroscience (same AS NBB 223_OX)

An introduction to the neurobiology of mental disorders such as depression and schizophrenia. (Oxford Only)

PSYC 223. Drugs and Behavior

A review of the behavioral and neurobiological actions of all the major psychoactive drugs, focusing on how drugs alter behavior by influencing brain mechanisms.

PSYC 302. Evolution of Acquired Behavior

Research and theory concerning the way information about the world is acquired and remembered.

PSYC 303. Human Learning and Memory

The evolutionary basis of learning to adapt to the environment. Detailed analysis of the mechanisms of learning and their evolutionary function.

PSYC 309. Brain and Language (Same as LING 309)

This course examines the relationship between brain mechanisms and language behavior. Topics include aphasia and language disorders, aphasia in the deaf, critical periods in children, and gender differences in brain organization.

PSYC 313. Neuropsychology and Developmental Disabilities

The effects of conditions such as blindness, deafness, cerebral palsy, and epilepsy on information processing behavior and psychological development in children.

PSYC 320. Animal Behavior (Same as BIOL 320)

Provides an overview of major research areas in the field of animal behavior. The behavior of animals will be analyzed from an evolutionary and comparative perspective. Some topics included are orientation and migration, genetic and environmental influences on behavior, population regulation, courtship and mating strategies, and parental behavior.

PSYC 321: Behavioral Neuroendocrinology of Sex (Same as NBB 321)

This course examines the role hormones, particularly steroid hormones, play in the development and activation of reproductive behaviors in animals and humans. In addition, the role of hormones in the development of sex differences in the brain and behavior will be explored.

PSYC 322. Biological Basis of Learning and Memory

Biological factors influencing memory with the attention to the findings from both animal and human research.

Kenneth Carter (Oxford-Psychology)

kenneth.carter@emory.edu, Professor

Researching systematic reviews of psychiatric medications.

William Michael Caudle (School of Public Health)

william.m.caudle@emory.edu, Assistant Professor/Principle Investigator

Contribution to environmental contaminants makes on development of neurobehavioral and neurodegenerative diseases, either independently or through their interaction with underlying genetic predispositions.

Anthony Chan (Yerkes: Human Genetics)

awchan@emory.edu, Associate Professor

Focus on development of a nonhuman primate model (NHP) of Huntington's disease (HD) that is not only physiologically comparable to humans but also carries a mutant huntingtin (HTT) gene that leads to HD as well as developing an Alzheimer's disease (AD) monkey model.

Nancy Collop (Pulmonology)

nancy.collop@emory.edu, Professor

Research interests include diagnostic testing for sleep-disordered breathing and standards for polysomnography.

Michael Crutcher (Neuroscience and Behavioral Biology)

michael.crutcher@emory.edu, Senior Lecturer

Demonstrating that a novel test of recognition memory can be used to diagnose Alzheimer's disease at the earliest possible stage.

Joseph Cubells (Human Genetics)

jcubells@genetics.emory.edu, Associate Professor

Expanding work into biochemical, physiological and psychological traits associated with psychiatric illness.

Frans de Waal (Psychology)

dewaal@rmy.emory.edu, Professor

Social behavior and social cognition emphasizing mechanisms of reconciliation and reciprocity in nonhuman primates.

Daniel D. Dilks (Psychology)

dilks@emory.edu, Assistant Professor

Human vision: 1) How is the visual cortex functionally organized?; How does this functional organization get wired up in development?, and how does the visual cortex change in adulthood? Dilks uses a variety of methods, including psychophysics and functional magnetic resonance imaging (fMRI) as well as transcranial magnetic stimulation (TMS).

Keith Easterling, (Neuroscience and Behavioral Biology)

keaster@emory.edu, Senior Lecturer

Investigating the effects of opioid withdrawal, using drug discrimination and other behavioral methodologies. Determining the effects of early post-natal stress on the opioid systems of adult rats.

David Edwards (Psychology)

edwards@emory.edu, Professor

Hormonal correlates of athletic competition, performance and ability.

Faculty Research Interests*

Jocelyne Bachevalier (Psychology)

jbachev@emory.edu, Professor

Ontogenetic development and decline of memory functions in primates.

John Banja (Ethics)

ibanja@emory.edu, Professor of Rehabilitation Medicine, Assistant Director of health science ethics at the Center for Ethics

Gary Bassell (Whitehead)

gary.bassell@emory.edu Professor

Mechanisms involved in mRNA trafficking and local protein synthesis and assess their function in axon guidance, regeneration and synaptic plasticity. Studying how impairments in these processes may underlie defects in Spinal Muscular Atrophy and Fragile X Syndrome

Pat Bauer (Psychology)

patricia.bauer@emory.edu, Associate Dean

Development of memory from infancy through childhood, with special emphasis on the determinants of remembering and forgetting; and links between social, cognitive, and neural developments and age-related changes in autobiographical or personal memory.

Gregory Berns (Psychology)

gberns@emory.edu, Professor

Functional magnetic resonance imaging, computer modeling and neuroeconomics. The relationship of neural systems to decision making by using a combination of computational and functional imaging techniques.

Michael Borich (Physical Therapy)

michael.borich@emory.edu, Assistant Professor

Harness the plastic capacity of the human nervous system in health and disease in an effort to improve rehabilitation outcomes for individuals with neurologic injury and disease.

Nicholas Boulis (Neurosurgery)

nboulis@emory.edu, Associate Professor

Biological neurorestoration and neuromodulation through the use of cell, protein and gene delivery to the nervous system.

Patricia Brennan (Psychology)

pbren01@emory.edu, Professor

The area of developmental psychopathology. The role of Psychophysiology and emotion in aggressive behavior.

Patrick Cafferty (Biology)

patrick.w.cafferty@emory.edu, Lecturer

Molecular interactions within cells to the complex behavioral patterns exhibited by members of a community.

Ronald L. Calabrese (Biology)

rcalabre@biology.emory.edu, Professor

Motor pattern generation and its modulation: electrophysiological and computational approaches.

PSYC 324. Sleep and Dreaming, Brain and Mind

This is a survey course presenting a biologically informed approach to sleep and dreaming under both typical and pathological conditions.

PSYC 325. Primate Social Psychology (Same as BIOL 325)

Recent progress in the field of primate social behavior, particularly the role of cognition in complex social strategies.

PSYC 335. Cognitive Neuroscience

An in-depth survey of the brain systems and mechanisms involved in perception, memory, awareness, communication, and other cognitive phenomena.

PSYC 350. Behavior Modification

Use the principles of behavior to enhance human functioning. Application of basic research and theory from experimental psychology to personal, social, and educational problems.

PSYC 414. Brain & Cognitive Development

This course examines developmental changes in brain function and organization linked to different aspects of sensory language, and non-language cognitive processes during the first three years of life.

PSYC 415. Sleep & Dreaming

Study of the neural mechanisms and phenomenology of sleep and dreaming in humans and other animals as a basis for discussing implications for behavior, cognition, evolution, and related philosophical issues.

PSYC 420 (WR). Psychobiology of Visual Perception

Prerequisites: Psychology 110 and 111 or Biology 141 and 142. Theories and research about how the brain interacts with mind in generating perceptions. (Fulfills Writing Requirement.)

PSYC 425. Brain Imaging (Same as NBB 425)

This course will focus on the application of imaging technology to the study of brain function and anatomy. We will cover the history of the development of brain imaging methods, methods, the technical basis for various imaging methods, and learn to apply imaging methods in the realms of both basic and clinical science.

PSYC 426. Neuropharmacology & Placebo (Same as NBB426)

Prerequisites: Biology 141 and 142, Chemistry 141 and 142. The focus will be drug development, namely the process by which a condition to be treated is identified and then medications are developed, tested, and finally distributed to patients.

PSYC 427. Biological Foundations of Behavior: Hormones, Brain and Behavior

Prerequisites: Prior completion of at least ONE of the following: PSYC 110, 103, NBB 201 or NBB 302. PSYC 320 is highly recommended.

PSYC 440. Animal Communication

Functions, evolution, ecology, and significance of animal communication systems in a wide taxonomic range from insects to primates. (Fulfills Writing Requirement.)

PSYC 473. Advance Seminar in Abnormal Psychology*

PSYC 474. Seminar: Developmental Psychology*

PSYC 475. Seminar Personality & Social Psychology*

PSYC 476. Seminar Biological Foundations of Behavior*

*Advanced Psychology Seminars have variable topics. **Requires approval NBB.**

Course Descriptions, Electives: Other

CHEM 468SWR. Perspectives in Chemistry* (**Requires written NBB approval.*)

ECON 481. Neuroeconomics (Same as NBB 481)

Prerequisites: Economics 201 and 212, or NBB 301 and 302, or consent of instructor. This course is designed to provide students with an introduction to the field of neuroeconomics. Upon completion of the course, students will have a basic understanding of the tools used to study the neurobiology of decision-making.

ECS 490W. Emory College Seminar* (*Requires written NBB approval.*)

ENG 386/386(W). Literature and Science* (*Requires written NBB Approval*)

ENG 389/389(W). Special Topics: Literature* (*Requires written NBB Approval*)

ENVS 385/385W. Topics: Environmental Science* (*Requires written NBB Approval*)

ENVS 475. Special Topics* (*Requires written NBB Approval*)

MUS 309. The Musical Brain (Same as NBB 300)

Prerequisites: Any one of the following courses: Biol 120; Biol 141,142; OR Music 114; Music 121-122. The course will examine the subjective experience and neural substrates of music perception and performance. Each week the class will participate in a dialog between musicians and neuroscientists examining both the experiential and mechanistic approach to music by asking questions such as "What makes something musical and how are the complex sounds of music processed by the brain?" Relationships of music to language, emotion and memory are examined as well as development of the musical mind from infancy to adulthood. Music therapy impact and evolution of musicality in animals and humans will be investigated

PHIL 316 BioEthics

This course explores the central questions of biomedical ethics, such as end-of-life issues, abortion, and justice in the distribution of health care.

PHIL_OX 382R. Topics in Philosophy. (i.e. Philosophy of the Mind)* (*Requires written NBB Approval*)

Examinations of proposed solutions to the mind-body problem, and such topics as consciousness, personal identity, machine intelligence, and the possibility and character of a scientific psychology. (Oxford only)

PHIL 425/425W. Philosophy of Science

Examination of scientific rationality and scientific method; topics covered include intertheoretic relations and the character of scientific change, concepts, theories, and explanations.

PHIL 482 (W). Topics in Philosophy (i.e. Philosophy of Medicine)* (*Requires written NBB Approval*)

Fertility and emphasizes interaction of sociocultural context with biology in reproduction and sexuality. Further topics: infertility, deviance, demographic transition, and population policy.

PHYS 227 Modern Med Physics

Explores some of the ways in which principles and methods used in physics are applied to problems in modern medicine. Includes a study of the physics of modern imaging systems such as MRI, CT, and PET as well as more traditional areas (x-ray, radiation, and nuclear medicine physics). Mathematical and statistical ideas will be developed as needed. For pre-med students, students in health or biological sciences, or physics majors who are curious about medical physics.

PHYS 380/385. Topics in Physics * (*Requires written NBB approval.*)

PHYS 434. Physical Biology (Same as BIOL 434)

Prerequisite: consent of instructor. This course will emphasize that all living systems have evolved to perform certain tasks in specific contexts.

Rel 370 – Special Topics in Religion (i.e. Cognitive Science of Religion) * (*Requires written NBB Approval*)

Additional Courses:

The NBB program requires 7 electives. From the list of courses below, one and only one of them can be used as an elective.

The remaining 6 electives must be taken from the courses listed above

Biol 205 Comparative Vertebrate Anatomy with lab

Biol 250 Cell Biology

Biol 264 Genetics: A Human Perspective

Biol 301 Intro Biochemistry I

Biol 302 Intro Biochemistry II

Chem 203 Advanced Reactivity

Chem 204 Macromolecules

Chem 221 Organic Chemistry I (with lab)

Chem 222 Organic Chemistry II (with lab)

Chem 301 Biochemistry I

Chem 302 Biochemistry II

CS 153 Computing for Bioinformatics

Math 207: Probability and Stats w/ Applications

Math 361 Probability and Statistics I

Math 362 Probability and Statistics II