NBB Course Descriptions Spring 2014

NBB 201  Foundations of Behavior
Prerequisite: Biology 141. This course presents an introduction to evolutionary processes and biological bases of behavior. Lectures and readings will be organized around a developmental and life history perspective and will emphasize the importance of context in biological mechanisms and the interaction of social life, behavior, and cognition. Examples drawn especially from humans and nonhuman primates will be used to place human behavior in the context of other species and to illustrate the dual inheritance of biology and culture in our species. Topics covered will include evolutionary mechanisms, adaptation, phylogenetic constraints, neural and neuroendocrine mechanisms of behavior, life history theory, developmental programs, principles of allometry, sexual selection and alternative reproductive strategies, social bonds and socialization, and the cognitive bases of social interaction in humans and nonhumans.

NBB 301  Introduction to Neurobiology
Prerequisites: Biology 141, Chemistry 141 and 142. 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 in invertebrates and vertebrates.

NBB 302  Behavioral Neuroscience
Prerequisite/co-requisite: NBB 301. This course presents 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 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. As primates, we are unusually social mammals and devote extensive cognitive effort and resources to managing and maintaining social relationships. Indeed, the need to interact skillfully with others may well have been one of the key selective pressures shaping the evolution of human brain and mind. There has been a recent explosion of research aimed at elucidating the neurobiological substrates that support human social cognition and behavior. This course will review and synthesize this growing body of research coming out of the fields of neuropsychology, psychiatry, neuroimaging and experimental animal research.

NBB 321  Behavioral Neuroendocrinology: Sex
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. The first third of this course covers biological mechanisms of hormone production and the regulation and function of the neuroendocrine system. A background in biology is helpful, but neither required, nor necessary. The concepts necessary to understand the biology of the neuroendocrine system are developed in class. The last two-thirds of the course cover the behavioral effects of hormones and are divided into the immediate effects of hormones (activation) and long-term effects of hormones (organization). Research covers both animals and humans with everything from sex changing fish to sex change in human's topics for consideration. This course provides a comprehensive overview of the manner in which hormones produce physical modifications and modulate sexual behavior in a variety of species.
NBB 361W  Project Lab in Neurobiology
A laboratory course in the theory and techniques of neurophysiology, using invertebrate model systems. Techniques will include extracellular recording, intracellular recording, computer data acquisition, and analysis of laboratory results. Topics include sensory receptor properties, postural motor nerve activity, synaptic plasticity, and ionic bases of resting and action potentials. Part of the semester will be devoted to student-designed projects. This is a writing-intensive course, with lab and project reports written in the form of scientific papers.

NBB 370  Special Topics: Explore NBB
NBB encompasses a large and diverse range of research questions, approaches and methods. We will explore cutting-edge research at Emory ranging from intracellular molecular studies, to animal behavior manipulations, to clinical studies, to medical humanities and neuroethics. What questions are researchers in NBB are exploring? 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. NBB encompasses a large and diverse range of research questions, approaches and methods, and so we will explore cutting-edge research at Emory ranging from intracellular molecular studies, to animal behavior manipulations, to clinical studies, to medical humanities and neuroethics. This class would be excellent preparation for students who have recently joined a research lab or who are considering joining a research lab. We will explore these questions with discussions, cases, guest speakers. Grading will be based on class participation, short investigative papers, collaborative projects, and a final research proposal.

NBB 370  Special Topics: Hands on Behavioral Neuroscience
Prerequisites: Biology and Chemistry 141 & 142, NBB 201 or 301 or permission of the instructor. This course will be conducted in a working laboratory (not a classroom setting). This is a "hands-on" course designed to acquaint students with the regulatory entities at Emory University, the techniques, and instrumentation utilized in a Behavioral Neuroscience laboratory. A representative experiment will be conducted. Students will work with animals (rat), will conduct one behavioral test, harvest the brain, perform an immunohistochemical assay, and prepare a poster that will present the results of their techniques. Students will also learn to plan experiments, maintain their notes and organize their electronic files appropriately.

NBB 404W  Roots of Modern Neuroscience
This course will trace contemporary issues in neuroscience from their origins in classical times through the 19th century and on to new frontiers with emphasis on primary works by the creators of neuroanatomy and neurophysiology. This course will trace contemporary issues in neuroscience from their origins in the 18th and 19th centuries to new frontiers. We will use a combination of primary scientific sources, literature and film. Among the topics treated will be the rise of modern clinical neurology in Europe, localization versus holism, seeking the locus of mind, neurons versus nets, the electric brain and the definition of life, exploring the senses via neuroscientific fictions, animal and computational models, approaching a conscious internet, brains as machines and machines as brains. Some examples of the readings are papers by Santiago Ramon y Cajal, Hermann von Helmholtz, Sir Charles Sherrington, Charcot, and Sigmund Freud; the novels Frankenstein and Neuromancer and short stories by S. Weir Mitchell, E. M. Forster and Philip K Dick.

NBB 426  Drug Development
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 470   Special Topics: Neuroanatomy
This course will provide a broad overview of the functional neuroanatomy of the brain and spinal cord. The course will begin with coverage of the general organization of the nervous system, including the central and peripheral nervous systems, development of the nervous system, gross anatomy and organization of the central nervous system, the meninges, ventricles and blood supply of the brain. The remainder of the course will focus on a systems level approach to the organization and functions of the brain, including the visual, auditory, somatosensory, oculomotor and motor systems of the brain as well as the basal ganglia, cerebellum and neocortex.

NBB 470   Special Topics: Sex, Gender, and the Brain
“Sex, Gender and the Brain” introduces the student to the interdisciplinary field of feminist science studies as well as the many intersections of this field with neuroscience. The course will include an historical analysis of scientific research on the brain in relation to gender as well as other intersectional markers such as race, class, sexuality and ability. Students will also examine current topics in neuroscience and gender as they relate to: (i) the question of intelligence; (ii) the relation between hormones and sexual behavior; (iii) our understanding of sex/gender roles and sexual identities; and (iv) the design and use of new neurotechnologies. Throughout this course, we will closely examine the scientific and theoretical practices in both neuroscience and feminism and probe the idea that these fields are co-constitutive. This course aims to inform students in the natural sciences, social sciences and humanities about the impacts of neuroscience research on society, as well as the impacts of social movements and their critiques on the development of neuroscience research and new neurotechnologies.

NBB 470   Special Topics: Neurodegenerative Diseases
This course will cover several neurodegenerative diseases with a focus on understanding the molecular underpinnings of each disease. Students will learn to dissect complex scientific literature to generate conceptual understanding of the disease. Student learning will be assessed by exams, class discussion, and written assignments.

NBB 470   Special Topics: Madness, the Brain, and Culture
This interdisciplinary seminar will explore mental illness in psychological, neurobiological, historical and cultural perspective. Conditions to be examined include autism, hysteria, schizophrenia, depression, post-traumatic stress disorder, multiple personality disorder, eating disorders, attention deficit, and Tourette syndrome. Care will be paid to consider the impact of racism, class, and gender on the construction of, explanations for, and interventions developed to treat mental illnesses. All these syndromes will also be viewed in the context of an increasing public health concern with mental health and mental illness. Attention will be paid to the neurobiological and psychiatric mechanisms associated with these disorders.

NBB 482R   Frontiers in Neuroscience
This seminar exposes neuroscience students to the most recent and cutting edge topics in neuroscience via the “Frontiers” series sponsored by the Graduate Program in Neuroscience. Students will interact with speakers and engage in post-seminar question and answer sessions, and turn in notes on the talks.

NBB 490   Clinical Neurology Study
Much more than a shadowing program, the course offers genuine clinical experience, classroom guidance on presentations, and a vigorous look at current issues and practices in medicine. Undergraduates will have an opportunity to correlate experience with actual patients with the science behind the diagnosis. Each student will be assigned a Clinical Neurology faculty mentor. In
the course, students meet both new and returning patients and listen as they describe their symptoms. This is the heart of the course: students learn the unique ways different individuals describe what has happened to them. The patients’ language and their facial expressions/emotions allow experienced doctors to distinguish the most important and pertinent symptoms. Students are expected to read about the symptoms that evening and try to understand the places in the nervous system and common diseases that could produce each symptom. Also, they record the medical terms and drugs mentioned by the doctor to be researched later. They watch as physicians perform neurological exams, develop the diagnosis, and plan treatment. Each participant is required to attend at least one half-day clinic weekly and select one patient each week to review in class. At the end of the course, each student, in consultation with their Neurology mentor, will select a patient to work up into an expanded case study. The student will present this case study in a formal 15-minute presentation and a poster at a conference with the format of a scientific meeting. Student’s work will be published online.

NBB 495A  Honors Research
Pre/co-requisites: permission of instructor and NBB 221 (without NBB221, no elective credit is given); cannot be taken concurrently with NBB 497WR or NBB 499R. A maximum of four hours of NBB 495A, 495BWR, 497R, 497WR, or 499R accepted as an elective toward the NBB major. Honors research in neurobiology/behavior. Registrants attend weekly meetings to present progress reports of their ongoing research, discuss how to write proposals and papers, and give oral presentations.

NBB 495BW  Honors Research
Prerequisites: permission of instructor; NBB 221 or QTM100 ((without one, no elective credit is given); NBB 495A (with permission of instructor, may substitute NBB 499R). Cannot be taken concurrently with NBB 499R; may not receive credit for NBB 495BWR and NBB 497WR under the direction of the same faculty mentor. A maximum of four hours of NBB 495A, 495BWR, 497R, 497WR, or 499R accepted as an elective toward the NBB major. Honors research in neurobiology/behavior. Registrants attend weekly meetings to present progress reports of their ongoing research, discuss how to write proposals and papers, and give oral presentations. To receive credit for the course and to satisfy the senior-year writing requirement, a student’s thesis must be accepted by the Honors Program.

NBB 497W  Supervised Writing
Prerequisite: permission of instructor; cannot be taken concurrently with NBB 498R; may not receive credit for NBB 497WR and 495BWR under the direction of the same faculty mentor. A maximum of four hours of NBB 495A, 495BWR, 498R, 497WR, or 499R accepted as an elective toward the NBB major. Independent, faculty-mentored research and writing, with major writing assignment(s) accounting for at least 60% of the grade.

NBB 498R  Supervised Reading
Prerequisite: permission of instructor; cannot be taken concurrently with NBB 497WR. A maximum of four hours of NBB 495A, 495B, 497R, 497, or 499R accepted as an elective toward the NBB major. Independent, faculty-mentored research; designed as a prelude to conducting laboratory research under the same mentor.

NBB 499R  Undergraduate Research
Up to eight hours may be taken, but a maximum of four hours of NBB 495A, 495BWR, 498R, 497WR, or 499R accepted as an elective toward the NBB major. Prerequisites: permission of instructor; for enrollment in a second semester, NBB 221 ((without NBB221, no elective credit is
given); cannot be taken concurrently with NBB 495A, 495BWR, or 497WR. Independent research in neurobiology/behavior. Registrants attend weekly meetings to present progress reports of their ongoing research, discuss how to write proposals and papers, and give oral presentations.