

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 300 majors and seventy-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; NBB 221, 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 Masters 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 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 ran 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.



## **EMORY COLLEGE**

## **Neuroscience and Behavioral Biology Program**

### **STUDENT HANDBOOK**

**2011-2012**

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## Neuroscience and Behavioral Biology Program

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[www.nbb.emory.edu](http://www.nbb.emory.edu)

Paul R. Lennard/Director

[paul.lennard@emory.edu](mailto:paul.lennard@emory.edu)

Phone: 404-727-4235

Alan Weinstein/Academic Department Administrator

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Phone: 404-727-4929

Nadia G. Brown/Academic Degree Program Coordinator

[nadia.brown@emory.edu](mailto:nadia.brown@emory.edu)

Phone: 404-727-4958

**Larry J. Young** (Psychiatry, 4335 WMB, 727-8272)

[lyoun03@rmy.emory.edu](mailto:lyoun03@rmy.emory.edu), Associate 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.

**Stuart Zola** (Director/Yerkes, 727-7707)

[szola@rmy.emory.edu](mailto:szola@rmy.emory.edu), Research Professor

Translational research explores how memory is organized in the brain using nonhuman primates and applies that to assessing Alzheimer's disease and mild cognitive impairment patients

## 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.

### COSIGN

College Student Interest Group in Neurology (COSIGN) is a channel through which undergraduates who are interested in the field of neurology can explore the discipline. COSIGN links students to physicians whom they can shadow and from whom they can receive mentoring. The club also facilitates interest in the neurological sciences by inviting Emory researchers to present their current work. COSIGN is the undergraduate chapter for "SIGN", which is in the medical school. Through partnership with SIGN, COSIGN undergraduates considering advancing into medical school can attend classes with first year medical students as well as meet third year medical students in clinic. COSIGN is sponsored by the American Academy of Neurology.

**Darrell R. Stokes** (Biology, 2127 Rollins Research Ctr., 404-727-4123)

[darrell.stokes@emory.edu](mailto:darrell.stokes@emory.edu), Professor

The structural, functional and biochemical heterogeneity of insect muscles. Constraints that muscle design places on the in vivo mechanics of muscle and its overall performance.

**Irwin Waldman** (Psychology, 36 Eagle Row, Rm. 475, 404-727-7430)

[psyiw@emory.edu](mailto:psyiw@emory.edu), Assoc. Professor

Developmental psychopathology research and methods.

**Elaine Walker** (Psychology, 36 Eagle Row, Rm. 487, 404-727-7438)

[elaine.walker@emory.edu](mailto:elaine.walker@emory.edu), Professor

The precursors and neurodevelopmental aspects of psychopathology, especially schizophrenia.

**Kim Wallen** (Psychology, 36 Eagle Row, Rm. 387, 404-727-4125)

[kim@rmy.emory.edu](mailto:kim@rmy.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.

**Jay Weiss** (Psychiatry & Behavioral Science, A-510N Emory West Bldg, 404-712-9771)

[jweis01@emory.edu](mailto:jweis01@emory.edu), Professor

Neuroimmunology; interaction of immune system with brain and behavior.

**Patricia L. Whitten** (Anthropology, 211 Geosciences Bldg, 404-727-7594)

[antpw@emory.edu](mailto:antpw@emory.edu), Professor

The influence of phytochemical, nutritional, endocrine and social factors on the development and expression of behavior and reproductive function in rodents and primates.

**George Wilmot** (Neurology, Woodruff Mem. Bldg, Ste 6303, 404-727-3965)

[chip.wilmot@emory.edu](mailto:chip.wilmot@emory.edu), Assistant Professor

Clinical outcome measures in ataxia patients, motion analysis, motor physiology, phenotype-genotype correlations in neurodegenerative disease.

**Phillip Wolff** (Psychology, 36 Eagle Row, Rm. 479, 404-727-7140)

[pwolff@emory.edu](mailto:pwolff@emory.edu), Associate Professor

From a cognitive science perspective, the relationship between language and cognition.

**Carol Worthman** (Anthropology, 214 Geosciences Bldg., 404-727-4489)

[worthman@emory.edu](mailto:worthman@emory.edu), Professor

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

**Paul Wolpe** (Ethics, Ethics Center 404 727-3150)

[pwolpe@emory.edu](mailto:pwolpe@emory.edu), Asa Griggs Candler Professor of Bioethics

Neuroethics which examines the ethical implications of neuroscience.

**David W. Wright**, Emergency Medicine, 531 Asbury Cir., EUH Annex, Ste 340, 404-616-6021)

[david.wright@emory.edu](mailto:david.wright@emory.edu), Assistant Professor-TT, Co-Director EMRC

The preclinical and clinical assessment of neuroprotectants as agents to enhance neuro-plasticity 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.

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; i.e., 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.

Students unhappy with their advisors should be aware, they can, at any time, change advisors. However, to change you must come in and make a request at the NBB office.

### NBB Checklist of Courses

#### Neuroscience & Behavioral Biology B.S. Program

Student \_\_\_\_\_ Post Grad Plans \_\_\_\_\_

ID# \_\_\_\_\_ Expected Graduation Date \_\_\_\_\_

Course (4 credits)	Please Check	Semester Course	Notes
BIOL 141/151	_____	_____	_____
BIOL 142/152	_____	_____	_____
CHEM 141/151	_____	_____	_____
CHEM 142/152	_____	_____	_____
MATH 115/116	_____	_____	_____
NBB 201/Anth 200	_____	_____	_____
NBB 301/Biol 360	_____	_____	_____
NBB 302/Psyc 353	_____	_____	_____
NBB 401	_____	_____	_____
Elective 1	_____	_____	_____
Elective 2	_____	_____	_____
Elective 3	_____	_____	_____
Elective 4	_____	_____	_____
Elective 5	_____	_____	_____

## EMORY COLLEGE GENERAL EDUCATION REQUIREMENTS

The general education component of an Emory undergraduate education is organized to present an array of intellectual approaches and perspectives as ways of learning rather than a prescribed body of content. Its purposes are to develop students' competencies in the skills and methods of writing, quantitative methods, a second language, and physical sciences as the three broad divisions of learning in the arts and sciences; to deepen students' perspectives on national, regional, and global history and culture, and to give every student some exposure to an interactive seminar experience. These purposes are met by a student's choosing from a range of individual courses within a clearly defined framework.

### General Stipulations

Students may use an approved General Education course to satisfy two appropriate requirements in Areas II through V, with the restrictions that no student may exercise this option more than twice, and that no course may satisfy more than two requirements.

In satisfying the General Education Requirements, students must distribute their work as follows:

- (1) At least two courses in the humanities (from two different departments) in addition to the first-year writing and the language requirements;
- (2) At least two courses in the social sciences (from two different departments);
- (3) At least two courses in the natural sciences beyond the quantitative methods requirement.

### Questions

Questions in reference to general education requirements should be directed to the College Office academic counselors or deans. For specific questions regarding degree certification, contact Lydia Castle in 300 White Hall or [lcastle@emory.edu](mailto:lcastle@emory.edu).

### Degree Applications

Degree applications **will be signed by the NBB Office NOT** your advisor. Please allow one week for processing. The degree applications are updated each semester, so please confirm that you have the appropriate application before submission. The application may be found at [http://www.college.emory.edu/current/graduation/degree\\_application.pdf](http://www.college.emory.edu/current/graduation/degree_application.pdf)

**Hillary R. Rodman** (Psychology, 36 Eagle Row, Rm. 381, 404-727-2391)

[hrodman@rmy.emory.edu](mailto:hrodman@rmy.emory.edu), Associate Professor

The organization, development, and plasticity of visual cortex, particularly "extra-striate" areas. Neural bases of face/object recognition and "blind-sight" and the evolution of cortical areas are major topics of interest.

**Leah Anderson Roesch**, (SIRE Program, White Hall 305, 404-727-6160)

[leah.roesch@emory.edu](mailto:leah.roesch@emory.edu), Director

Molecular basis of neurodegenerative disease. SIRE - undergraduate research working with students doing research in all fields – from vocal pedagogy, to women in politics, to theater set design to molecular basis of neurodegenerative disease!

**Deboleena Roy** (NBB, Women's Studies, 128 Candler Library, 404-727-7083)

[droy2@emory.edu](mailto: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, 4127 WMB, 404-712-2393)

[sanchez@rmy.emory.edu](mailto:sanchez@rmy.emory.edu), Assistant Professor

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

**Krish Sathian** (Rehab Ctr. Modular Bldg 150, 404-727-1366)

[krish.sathian@emory.edu](mailto:krish.sathian@emory.edu), Associate Professor of Rehabilitation Medicine

Tactile perception, its neural basis and its alteration in neurological disorders.

**Iain Shepherd** (Biology, 1131 Rollins Research Ctr., 404-727-2632)

[ishephe@emory.edu](mailto:ishephe@emory.edu), Assistant 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, 210 Geosciences Bldg., 404-727-4200)

[antbs@emory.edu](mailto:antbs@emory.edu), Professor

A cultural anthropologist

**Melody Siegler** (Biology, 2107 Rollins Research Ctr., 404-727-0071)

[msiegler@biology.emory.edu](mailto:msiegler@biology.emory.edu), Associate Professor

Development of phenotypic diversity in neurons and the role of engrailed protein in phenotypic specificity.

**Sam Sober** (Biology, 1510 Clifton Rd Rm 2006, 404-727-5846)

[samuel.j.sober@emory.edu](mailto: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, Rollins 2125, 404-727-6932)

[amanda.starnes@emory.edu](mailto:amanda.starnes@emory.edu), Senior Lecturer

**Donald G. Stein** (Emergency Med, 1648 Pierce Dr, 404-712-9704)

[donald.stein@emory.edu](mailto:donald.stein@emory.edu), Professor

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

**Wendy Newby** (1946 Starvine Way, Suite 310 SAAC Bldg. Clairmont Campus, 404-727-6766)  
[wnewby@emory.edu](mailto:wnewby@emory.edu), Assistant Dean  
Understanding the interaction between learner characteristics, teaching practices, and instructional outcomes.

**Lynne Nygaard** (Psychology, 36 Eagle Row, Rm. 379, 404-727-0766)  
[lnygaard@emory.edu](mailto:lnygaard@emory.edu), Associate Professor  
Research interests include the perception of speech and other auditory events.

**Laura Otis** (English, Callaway Ctr. N-306, 404-727-2234)  
[lotis@emory.edu](mailto:lotis@emory.edu), Professor  
Dr. Otis compares the ways that neuroscientists and literary writers conceive of memory, identity, and visual and auditory perception.

**Chikako Ozawa-de Silva** (Anthropology, Geosciences Bldg, 305, 404-727-4467)  
[cozawad@emory.edu](mailto:cozawad@emory.edu), Assistant Professor  
Medical anthropology, anthropology of body and mind, discourse of selfhood, therapies and healing practices, suicide, psychiatric disorders and meditation, religious practices.

**Lisa Parr** (Yerkes, 404-727-3653)  
[parr@rmy.emory.edu](mailto:parr@rmy.emory.edu),  
Social cognition in chimpanzees. 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.

**Paul Plotsky** (WMB 4105, 404-727-8257)  
[Paul.plotsky@emory.edu](mailto:Paul.plotsky@emory.edu), Professor  
Interaction between genes and the perinatal environment in shaping the developing nervous system. Using rodent and nonhuman primate models in collaboration with clinical researchers, he has developed animal models of vulnerability to a variety of psychiatric and medical diseases.

**Todd Preuss** (Pathology Yerkes, 954 Gatewood Road, 404-727-8556)  
[tpreuss@rmy.emory.edu](mailto: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, 2105 Rollins Research Ctr., 404-727-5191)  
[astrid.prinz@emory.edu](mailto:astrid.prinz@emory.edu), Assistant Professor  
Computational and experimental methods to study pattern generation and homeostatic regulation in small neural networks.

**Ivan Rasnik** (Physics, Math & Science Ctr N214, 404-727-4039)  
[ivan.rasnik@emory.edu](mailto:ivan.rasnik@emory.edu), Assistant Professor.  
Molecular and Cellular Biophysics.

**James Rilling** (Anthropology, 114 Anthropology Bldg, 404-727-2391)  
[jrilling@emory.edu](mailto:jrilling@emory.edu), Assistant Professor  
Neural bases of human behavior, evolution of social behavior, comparative primate neurobiology, human brain evolution.

**Mark Risjord** (Philosophy, 112 Bowden Hall, 404-727-2160)  
[mrjsjor@emory.edu](mailto:mrjsjor@emory.edu), Associate Professor  
The relationship between scientific judgment and moral or political evaluation in the philosophy of science.

## College General Education Requirements

EFFECTIVE FALL 2009 - REFER TO EMORY COLLEGE WEBSITE FOR INCOMING FRESHMAN

I. **First Year Seminar (FSEM)** \_\_\_\_\_ 1st yr Fall or Spring (circle sem.)  
Course number

II. **First Year Writing Requirement (FWR)**  
ENG 101/ ENG 181/ CPLT 110 (circle class) 1st yr Fall or Spring (circle sem.)

III. **Continuing Writing Requirement (WRT)**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Course number Semester and year

IV. **Mathematics and Quantitative Reasoning (MQR)**

Course number Semester and year

IV. **Science, Nature, Technology (SNT)**

1. \_\_\_\_\_ Lab course

2. \_\_\_\_\_

Course number Semester and year

VI. **History, Society, Cultures (HSC)**

1. \_\_\_\_\_

2. \_\_\_\_\_

Course number Semester and year

VII. **Humanities, Arts, Performance (HAP/HAL)**

1. \_\_\_\_\_ Language course (HAL)

2. \_\_\_\_\_ Language course (HAL)

3. \_\_\_\_\_ (HAP or HAL)

4. \_\_\_\_\_ (HAP or HAL)

Course number Semester and year

VIII. **Personal Health (HTH)**

PE 101 \_\_\_\_\_

Semester and year

IX. **Physical Education and Dance (PED/PPF)**

1. \_\_\_\_\_ Principles of Physical Fitness

2. \_\_\_\_\_

3. \_\_\_\_\_

Course number Semester and year

### 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 study abroad exchange program with the University of St. Andrews in Scotland.

### NBB Major Requirements

The major requires a minimum of nine courses (thirty-six 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/SWR. In addition to the core courses, a minimum of five (4 hr credit) NBB electives are needed.

All majors are required to take the following introductory foundation courses: Biology 141/151 and Biology 142/152; Chemistry 141/171 and Chemistry 142/172; and one semester of Life Sciences Calculus (Math 115 or Math 116). 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 and sponsorship by a member of the neuroscience and behavioral biology core faculty. Students must complete NBB 221 and two semesters of undergraduate research NBB 495A (4 hrs) & NBB 495BWR (4hrs) as well as attending a biweekly Honors seminar. In addition, students are required to enroll in at least one graduate – level course.

**David Lynn** (Chemistry, Emerson Hall, 404-727-9348)

[david.lynn@emory.edu](mailto: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, 36 Eagle Row, Rm. 373, 404- 727-7470)

[dmaney@emory.edu](mailto:dmaney@emory.edu), Assistant Professor

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

**Joe Manns** (Psychology, 36 Eagle Row, Rm.481, 404-727-7459)

[jmanns@emory.edu](mailto:jmanns@emory.edu), Assistant 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.

**Lori Marino** (Psychology, 36 Eagle Row, 404-727-7582)

[lmario@emory.edu](mailto:lmario@emory.edu), Senior Lecturer

Brain and behavioral evolution in mammals; cross-taxonomic comparisons of neurobiology, behavioral ecology, life history, and cognition in cetaceans and primates.

**Pat Marsteller** (Biology, Hughes Science Initiative & ECCSE, 404-727-9696)

[pmars@learnlink.emory.edu](mailto:pmars@learnlink.emory.edu), Director/ECCSE

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

**Tony Martin** (Environmental Studies, 404-727-6476)

[paleoman@learnlink.emory.edu](mailto:paleoman@learnlink.emory.edu)

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

**Robert N. McCauley** (Philosophy, 111 Bowden Hall, 404- 727-0103)

[philrnm@emory.edu](mailto:philrnm@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.

**Chris Muly** (Psychiatry/Yerkes, 404-727-9603)

[ecmuly@rmy.emory.edu](mailto:ecmuly@rmy.emory.edu)

Neuroanatomy of dopaminergic systems in primates

**Darryl Neill** (Psychology, 36 Eagle Row, Rm. 391, 404-727-7445)

[dneill@emory.edu](mailto: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, Math and Science Ctr N240, 404-727-9286)

[Ilya.nemenman@emory.edu](mailto:Ilya.nemenman@emory.edu), Associate Professor

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

**Dieter Jaeger** (Biology, 2129 Rollins Research Ctr., 404-727-8139)

[djaeger@biology.emory.edu](mailto:djaeger@biology.emory.edu), Associate Professor

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

**Heather Kimmel** (2101A Division of Neuroscience-Yerkes, 404-727-5052)

[hkimme@rmy.emory.edu](mailto:hkimme@rmy.emory.edu), Assistant Professor

Examining the neurochemical and behavioral effects of drugs of abuse in nonhuman primates to develop effect pharmacotherapies for addicts.

**Melvin Konner** (Anthropology, 106 Geosciences Bldg, 404-727-4195)

[antmk@mindspring.com](mailto:antmk@mindspring.com), Professor

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

**Howard Kushner** (Ins. Of Liberal Arts/RSPH 516 Grace Rollins Bldg., 404-727-9523)

[hkushne@emory.edu](mailto:hkushne@emory.edu), Professor

History of medicine and disease, psychiatry and neurology, and addiction.

**Michelle Lampl** (Anthropology, 218C Geosciences Bldg, 404- 727-2214)

[mlampl@emory.edu](mailto:mlampl@emory.edu), Associate Professor

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

**Paul Lennard**, Director (NBB, 1462 Clifton Road, Suite 304, 404-727-4235)

[prlenna@emory.edu](mailto:prlenna@emory.edu), Associate Professor

Pathogenesis of primary myopathies, progression of degenerative neuromuscular diseases.

**Allan Levey** (SOM: Neurology, WMRB 6005, 404-727-7220)

[Allan.levey@emory.edu](mailto:Allan.levey@emory.edu), Professor of Psychiatry

Investigating Alzheimer's and Parkinson's diseases.

**Richard Levinson** (School of Public Health, 404-727-7703)

[rlevins@sph.emory.edu](mailto:rlevins@sph.emory.edu)

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

**Scott Lilienfeld** (Psychology, 36 Eagle Row, Rm. 473, 404-727-1125)

[slilien@emory.edu](mailto:slilien@emory.edu), Associate 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, 2131 Rollins Research Center, 404-727-5274)

[robert.liu@emory.edu](mailto:robert.liu@emory.edu), Assistant Professor

Computational neurobiology-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.

### **Course Descriptions, NBB Core Courses**

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

Spring. 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. (New General Education Requirements: Area II B2 - Natural Sciences/Non-Lab)

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

Spring and Fall. 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)**

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 401. Perspectives in Neurobiology and Behavior**

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

### Independent Research

#### NBB 495A. Honors Research

Fall, Spring, Summer. Open to senior NBB majors enrolled in the College Honors Program. Honors research in neurobiology/behavior. Registrants attend biweekly meetings to present progress reports of their ongoing research, discuss how to write proposals and papers, and give oral presentations. Pre/co-requisites: Permission of instructor and NBB 221 (Psychology 230 not accepted). Cannot be taken concurrently with NBB 497, 497R or NBB 499R. A maximum of four hours of NBB 495A, 495B, 497, 497R or 499R accepted as an elective toward the NBB major.

#### NBB 495B. Honors Research

Fall, Spring, Summer. Open to senior NBB majors enrolled in the College Honors Program. Prerequisites: Permission of instructor, NBB 221 (Psychology 230 not accepted), NBB 495A (with permission of instructor, may substitute NBB 499R). Cannot be taken concurrently with NBB 499R; may not receive credit for 497 and 495B under the direction of the same faculty mentor. A maximum of four hours of NBB 495A, 495B, 497R, 497, or 499R accepted as an elective toward the NBB major. Honors research in Neurobiology/behavior. Registrants attend biweekly meetings to present progress reports of their ongoing research, discuss how to write proposals, papers and give oral presentations. To receive credit for the course and to satisfy the senior-year writing requirement, a student thesis must be accepted by the Honors Program.

#### NBB 497R. Supervised Reading

Fall, Spring, Summer. 1-4 hour credit. Prerequisite: permission of instructor; cannot be taken concurrently with NBB 497. 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 497. Supervised Writing

Fall, Spring, Summer. Particulars: Permission of instructor; cannot be taken concurrently with NBB 497R; may not receive credit for 497WR and 495BWR under the direction of the same faculty mentor. 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 and writing, with major writing assignment(s) accounting for at least 60 percent of the grade.

#### NBB 499R. Undergraduate Research

Fall, Spring, Summer. Four-hour credit. Up to eight hours may be taken, but a maximum of four hours of NBB 495A, 495B, 497, 497R, or 499R accepted as an elective toward the NBB major. Prerequisites: Permission of instructor, for enrollment in a second semester, NBB 221 is required (Psychology 230 not accepted). Cannot be taken concurrently with NBB 495A, 495B, 497 or 497R. Independent research in neurobiology/behavior. Registrants attend biweekly meetings to present progress reports of their ongoing research, discuss how to write proposals, papers, and give oral presentations.

**Arthur W. English**, (Cell Biology, Whitehead 405P, 404-727-6250)

[art@cellbio.emory.edu](mailto:art@cellbio.emory.edu), Professor

Enhancing functional recovery following injury to the peripheral nervous system. Investigating the roles played by the neurotrophins BDNF and NT-4/5 in that enhancement, as well as in the reformation of synapses at both neuromuscular junctions and spinal motoneurons.

**Nicholas Fotion** (Philosophy, 113 Bowden Hall, 404-727-7672)

[philnf@emory.edu](mailto:philnf@emory.edu), Professor

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

**Kristen Frenzel** (NBB, 1462 Clifton Rd, 404-727-1317)

[kfrenze@emory.edu](mailto:kfrenze@emory.edu), 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, 36 Eagle Row, Rm. 389, 404-727-7444)

[psyhg@emory.edu](mailto:psyhg@emory.edu), Professor

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

**Sarah M. Gouzoules** (NBB/Anthropology, 404-727-1354)

[sgouzou@emory.edu](mailto:sgouzou@emory.edu), Senior Lecturer and Director of Undergraduate Studies)

Primate vocal communication; macaque social behavior.

**Stephan Hamann** (Psychology, 36 Eagle Row, Rm. 371, 404-727-4261)

[shamann@emory.edu](mailto: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) and the effect of emotion on memory; the application of neuroimaging techniques to memory research; perception of emotion in facial expression.

**Benjamin Hampstead** (Rehabilitation Medicine, 1441 Clifton Rd, Suite 150, 404-728-4837)

[bhampst@emory.edu](mailto:bhampst@emory.edu), Assistant Professor

Examining the efficacy of cognitive rehabilitation in patients with various neurological injuries and diseases as measured both behaviorally and through functional magnetic resonance imaging.

**Robert Hampton** (Psychology, 36 Eagle Row, Rm. 369, 404-727-5853)

[robert.hampton@emory.edu](mailto:robert.hampton@emory.edu), Assistant Professor

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

**Linton Hopkins** (Neurology/Emory Clinic A, 404-778-3452)

[lhopkin@emory.edu](mailto:lhopkin@emory.edu), Professor.

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

**Leonard Howell** (2214B Division of Neuroscience-Yerkes, 404-727-7786)

[leonard@rmy.emory.edu](mailto:leonard@rmy.emory.edu), Professor.

**Elizabeth Buffalo** (Yerkes Primate Research Center, 954 Gatewood Road, 404-727-7458)

[elizabeth.buffalo@emory.edu](mailto:elizabeth.buffalo@emory.edu), Assistant Professor

The long-range goal of this research is to contribute to a better understanding of the neuronal mechanisms involved in the establishment and maintenance of memory. The system of structures includes the hippocampus and the cortex that surrounds the hippocampus.

**Ronald L. Calabrese** (Biology, 2113 Rollins Research Ctr. 404-727-0319)

[rcalabre@biology.emory.edu](mailto:rcalabre@biology.emory.edu), Professor

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

**C. Monica Capra** (Economics, 328 Rich Bldg, 404-727-6387)

[mcapra@emory.edu](mailto:mcapra@emory.edu), Assistant Professor

Experimental and Behavioral Economics (Neuroeconomics): using laboratory experiments to study decision making in economic environments

**Kenneth Carter** (Oxford-Psychology, 214A Seney) 770-784-8439)

[kenneth.carter@emory.edu](mailto:kenneth.carter@emory.edu), Associate Professor

Researching systematic reviews of psychiatric medications.

**Joseph Cubells** (Human Genetics, 7213 Woodruff Mem. Building, 404-727- 2005)

[jcubells@genetics.emory.edu](mailto:jcubells@genetics.emory.edu), Medical Director

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

**Michael Crutcher** ((NBB, 1462 Clifton Rd, 404-727-5011)

[michael.crutcher@emory.edu](mailto:michael.crutcher@emory.edu), Lecturer

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

**Frans de Waal** (Psychology, 36 Eagle Row, Rm. 399, 404-727-3695)

[dewaal@rmy.emory.edu](mailto:dewaal@rmy.emory.edu), Professor

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

**Keith Easterling**, (NBB, 1462 Clifton Road, Suite 304, 404-727-4743)

[keaster@emory.edu](mailto: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.

**Henry Edelhauser** (Ophthalmology, 404-778-5853)

[ophthfe@emory.edu](mailto:ophthfe@emory.edu)

**David Edwards** (Psychology, 36 Eagle Row, Rm. 485, 404-727-4128)

[edwards@emory.edu](mailto:edwards@emory.edu), Professor

Hormonal correlates of athletic competition, performance and ability

**Eugene Emory** (Psychology, 36 Eagle Row, Rm. 499, 404-727-7455)

[eemory@emory.edu](mailto:eemory@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.

### Course Descriptions, Electives-NBB

#### **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 New General Education Freshman Seminar requirement and will also count as an NBB elective.

#### **NBB 221. Research Methods in Neuroscience**

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. This course will be required of all NBB majors taking NBB 499R.

#### **NBB 300. The Musical Brain**

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.

#### **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 350. Animal Welfare**

In this course we will explore the ethical issues which arise when humans interact with other animals. Particular focus will be placed on concerns relevant to neuroscientists and other researchers. We will analyze the philosophical debates about the moral status of animals and examine the existing scientific evidence that we can bring to bear on animal welfare issues. Our overall objective is to achieve open and critical thinking about animal welfare issues.

#### **NBB 361S. Experimental Neurobiology Lab**

Prerequisites: NBB 301 and permission of instructor. A course in experimental neuroscience designed for juniors who may be interested in research. One module stems from the current research linking a single gene, the vasopressin 1a receptor, to monogamous behavior in voles. The second module will teach students to handle primary cultures of neurons and glia and to use immunocytochemistry and current imaging techniques to identify cell types and cellular substructures. (Satisfies a writing requirement)

#### **NBB 370.**

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

**NBB 404. 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 18<sup>th</sup> and 19<sup>th</sup> 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 Psychology 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 Psychology 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. Drug Development**

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 460S)**

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.**

Variable topics of special interest in the field of Neuroscience & Behavioral Biology. Some recent offerings are listed below:

*Brain Repair Seminar:*

Until recently, many believed that functional and structural recovery after damage to the central nervous system was not possible. This course reviews the historical backgrounds of this belief and evaluates contemporary theories and current research on plasticity, functional localization, and repair in the central nervous system.

*Clinical Neurology Study:* Students will act as a "patient assistant," helping patients who may have partial paralysis or loss of sensation. Students will choose an individual patient to present and will conduct research on the patient's neurological problem.

**Faculty Research**

**George Armelagos** (Anthropology, 111 Geosciences Bldg., 404-727-2215)  
[antga@learnlink.emory.edu](mailto:antga@learnlink.emory.edu), Professor

The interaction of biological and cultural system as applied to evolutionary problems. The evolution of food choice, documenting the impact of agricultural development on health and disease.

**Jocelyne Bachevalier** (Psychology, 36 Eagle Row, Rm. 397, 404-727-9765)  
[jbachev@emory.edu](mailto:jbachev@emory.edu), Professor

Ontogenetic development and decline of memory functions in primates.

**John Banja** ((Ethics, Ethics Center 404 727-4804)

[jbanja@emory.edu](mailto:jbanja@emory.edu), Associate Professor of Rehabilitation Medicine, Assistant Director of health science ethics at the Center for Ethics

**Lawrence W. Barsalou** (Psychology, 36 Eagle Row, Rm. 483, 404-727-4338)  
[barsalou@emory.edu](mailto:barsalou@emory.edu), Professor

The acquisition, representation, and use of knowledge, ranging across perception, memory, language, and thought. The perceptual bases of the human conceptual system, the construction of categories to achieve goals, the roles of situations in conceptual processing, and the representation of individuals.

**Gary Bassell** (Whitehead Bldg 405K, 404-727-3772)  
[gary.bassell@emory.edu](mailto:gary.bassell@emory.edu) Professor

The mechanisms involved in mRNA trafficking and local protein synthesis and assess their function in axon guidance, regeneration and synaptic plasticity. We are also studying how impairments in these processes may underlie defects in Spinal Muscular Atrophy and Fragile X Syndrome

**Patricia J. Bauer** (Psychology, 36 Eagle Row, Rm. 365, 404-712-8460)  
[Patricia.bauer@emory.edu](mailto:Patricia.bauer@emory.edu), Asa Griggs Candler Professor

Imaging Memory with Event Related Potentials(ERPS). By comparing how the brain responds to pictures of things that the infant or child has seen before, and how it responds to pictures from sequences that have not been demonstrated, we can "see" the neural processing that takes place as infants and children remember.

**Christopher Beck** (Biology, 1105 Rollins Research Center, 404-712-9012)  
[cbeck@biology.emory.edu](mailto:cbeck@biology.emory.edu), Senior Lecturer

Intersection of behavioral ecology, physiological ecology, and life history evolution. Uses a combination of field, laboratory, and modeling experiments.

**Gregory Berns** (Psychiatry, 101 Woodruff Circle., Suite 4000, 404-727-2556)

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

**Patricia Brennan** (Psychology, 36 Eagle Row, Rm. 367, 404-727-7458)  
[pbren01@emory.edu](mailto:pbren01@emory.edu), Associate Professor

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

**Course Descriptions, Electives: Other****CHEM 468. Perspectives of Chemistry: Taken Out of Context (Same as an NBB 470)**

In this course, we will take a step back and explore context as an necessary component in understanding our own identity and place in the world. (satisfies a writing requirement)

**CHEM 468. Perspectives of Chemistry: Proteins, Patients, & Prisoners (Same as an NBB 470)**

This seminar will explore the connections among the topics of proteins, patients, and prisoners, and how they relate to your health and your world.(satisfies a writing requirement)

**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.

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

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 205. Introduction to Biomedical Ethics**

Moral issues related to medical practice and research, such as right to life, death and treatment, allocation of medical resources, confidentiality, abortion, and coercion in experimentation.

**PHIL 350 (WR). 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 360. Philosophy of the Mind**

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.

**PHIL 482 (WR). Topics in Philosophy (i.e. Philosophy of Medicine)**

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

**PHYS 380. Special Topics: Physical Biology (Same as BIOL 385 and NBB 370)**

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

**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 482. Frontiers in Neuroscience**

Fall, Spring; 1 hour 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.)

**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 260. Psychological Anthropology**

Cultural influences on personality development; culture and personality theory, and problems in cross-cultural Psychological research.

**ANT 301. Sex and Evolution**

Application of principles of evolutionary biology to animal reproductive strategies and their application to modern humans. A review of cross-cultural sexual practices and occurrence of commonalities is included.

**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 303. Modern Human Origins**

This course will examine the origins of modern humans, their unique cultural abilities, and their relationships to more archaic beings, such as Neanderthals. What makes us human and how this evolved will be explored in French and English literature.

**ANT 304. Primate Social Psychology (Same as BIOL 325 and PSYC 325)**

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

**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 308. Evolution of Social Behavior**

Prerequisite: Anthropology 201 or Biology 142. Application of evolutionary theory to social behavior of a variety of animals, including humans.

**ANT 309. Seminar in Primate Behavior**

Prerequisite: Anthropology 101, 201, or 210. Relationship between ecology and individual and social behavior, dominance relations, intelligence, and communication.

**PSYC 325. Primate Social Psychology (Same as ANT 304 and BIOL 325)**

Recent progress in the field of primate social behavior, particularly the role of cognition in complex social strategies. The course will evolve into an understanding of the actions of several drugs in the brain and consequent effects on behavior.

**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 410S. Science and Pseudoscience in Psychology**

Critically evaluating pseudoscientific, fringe-science, and controversial claims in Psychology. Please see department.

**PSYC 415S. 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. 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.

**5. 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, the technical basis for various imaging methods, and learn to apply imaging methods in the realms of both basic and clinical science.

**PSYC 440S Animal Communication**

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

**PSYC 473. Brain Repair (when offered)****PSYC 474S. Brain and Cognitive Development (when offered)****PSYC 475S. Introduction to Human Neuropsychology (when offered)**

The evolution of the pathways associated with processes like fatty acid metabolism, glycolysis, and respiration will be explored

**PSYC 476. Biological Foundations of Behavior: Hormones, Brain and Behavior**

**Course Descriptions, Electives: Psychology****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 302. Human Learning and Memory**

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

**PSYC 309. Brain and Language (Same as Linguistics 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. Complex disorders such as learning disabilities, childhood psychoses, and mental retardation are examined in the light of what has been learned about the simpler disorders.

**PSYC 320. Animal Behavior (Same as BIOL 320)**

A survey course examining the structure and function of animal behavior from a comparative and evolutionary perspective.

**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.

**PSYC 323. 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.

**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 313. Human Development in Biocultural Perspective**

This course examines theories of development and applies them to analysis of human anatomy in several dimensions: biological, behavioral, psychological, and sociocultural. Cross-cultural case studies allow exploration of the dynamic interplay of biology and society in human development.

**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 321. Anthropology of Human Reproduction**

This course examines biological, cultural and behavioral determinants of human

**ANT 323. Sex Differences: Biological Bases**

Examination of the biological bases of sex differences and their development.

**ANT 333. Disease and 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, and malnutrition.

**ANT 334. Evolutionary Medicine**

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

**ANT 361. Symbolic Anthropology**

Culture is viewed as distinctive symbolic patterns through which a worldview is built. Human behavior as symbolic action; human knowledge as partly a creation of cultural patterns.

**ANT 385. 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 385. Various Topics (as approved by NBB)**

biomolecules, including proteins, carbohydrates, DNA, and RNA. First half of two-semester biochemistry sequence.

**Course Descriptions, Electives: Biology****BIOL 241. 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.

**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.

**BIOL 325. Primate Social Psychology**

Recent progress in the field of primate social behavior, particularly the role of cognition in complex social strategies. The course will evolve into an understanding of the actions of several drugs in the brain and consequent effects on behavior.

**BIOL 336 or 346. Human Physiology or Honors Human Physiology**

A study of human physiology emphasizing integrated body functions. Topics include respiration, circulation, contractility, osmoregulation, endocrinology, and neurophysiology.

**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.

**BIOL 358. Evolutionary perspectives on Behavior**

Ethological and sociobiological approaches to understanding the interaction between genetic and environmental factors in the control, development, and evolution of animal and human behavior.

**BIOL 385 Special Topics: Physical Biology (Same as PHYS 380 and NBB 370)**

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

**BIOL 402SWR. 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; NBB 301 or Biology 360.

**BIOL 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.

**BIOL 450. Computational Neuroscience**

*Prerequisites:* Biol 360 or IBS 502 or equivalent. Exploration of single neurons and biological neural networks with computer simulations. Each class consists of an introductory lecture followed by computer tutorials using the GENISIS software under UNIX. Specific topics include passive cable theory, compartmental modeling, voltage-gated and synaptic conductances, motor pattern generation, and cortical networks.

**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.