Topics in Neurobiology and Behavior
G4440

Spring 2014, Wednesdays 6:10-8PM
Schermerhorn 405
Instructor: Katherine Nautiyal, PhD

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Office hours: Wednesdays 5-6pm and by appointment in 356 Schermerhorn

Course overview: We will explore current research relating to various 'hot topics' in the field of behavioral neuroscience including obesity, drug addiction, and sexual attraction and preference. We'll look at some of these issues from the behavioral, systems, cellular and molecular levels pulling from both animal and human studies.

Prerequisites: Mind, Brain and Behavior (Psych 1010) or an equivalent biological-based psychology class is required. Courses in statistics and/or research methods would be helpful, but are not required. The permission of the instructor is required in order to register.

Course objectives: This course fulfills the Seminar Requirement for the Psychology Major and the Advanced Seminar Requirement for the Neurobiology and Behavior Major.

The goals of this course are:

- to gain an advanced understanding of topics in behavioral neuroscience by reading primary scientific literature
- to read, understand and orally present primary scientific literature from psychology and neuroscience journals
- to be able to critically evaluate published research and discuss its merits, caveats and alternative interpretations
- to develop a review commentary or research proposal on a research topic by reading and evaluating published research

Course requirements:

Weekly readings/assignment and participation (25%): You will be expected to carefully read a scientific research paper (or a few shorter papers) each week. The chosen paper(s) will be primary research reports from seminal findings on the topic of the week. Some basic background knowledge of the topic is expected. In some cases, this may need to be supplemented through textbooks or other references cited in the assigned reading. Everyone will post a comment, thought or substantial question on the paper before class on the Discussion Board of Courseworks which will serve as a basis for discussion during class.

Presentation of two papers (40%): Each week, 2 or 3 of you will present one of the assigned readings in an approximately 30 minute slide presentation and initiate a short discussion of the paper. Each student will present 2 papers during the semester. Written feedback will be provided one week following the presentation.

Research proposal or review paper (35%): A term project will be required, on a topic of your choosing from material covered during the seminar (~10-15pg). It may consist of either a research proposal or a research review paper. Detailed information will be given at the start of the course. The project will require that you meet individually with the instructor to get approval on the topic and outline. Outline due April 9, ten minute presentation of paper on April 30, final paper due April 30.

Class policies:

Attendance: You are expected to come to class each week prepared to discuss the assigned papers. Your unexcused absence will be noted and reflected in your participation grade. Make-up 'participation' for pre-approved excused absences will be arranged on an individual basis.

Assignments: Paper presentations are assigned based on solicited preferences during the first week of the semester and once assigned may not be changed. In the case of a documented medical or family emergency, alternate arrangements will be made to present the paper individually during office hours.
The due date for the term paper is firm, and as such, one letter grade will be deducted for each day it is late.

Academic Integrity: "The intellectual venture in which we are all engaged requires of faculty and students alike the highest level of personal and academic integrity. As members of an academic community, each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity. . . . In practical terms, this means that, as students, you must be responsible for the full citations of others' ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent."
From the Faculty Statement on Academic Integrity - www.college.columbia.edu/academics/integrity-statement.

Cheating on assignments or exams and plagiarism are very serious violations within the academic community. Students are expected to do their own work on all tests and assignments for this class. You are expected to always act in accordance with the Columbia honor code. Any student found cheating or plagiarizing in this class will be reported to Columbia's Office of Judicial Affairs and Community Standards for evaluation and academic discipline. If you have questions about any aspect of academic integrity at Columbia, please refer to the following link: www.college.columbia.edu/academics/integrity and if you have specific questions about the judicial process, please see www.college.columbia.edu/academics/disciplinaryprocess.

Class Schedule

Please note that readings and topics will likely change based on enrollment number and student preferences.

January 22:

Course Information

Information will be given on: course format, evaluation, discussion board posts, presentation of papers, class discussion, term paper.

January 29:

Animal Models

Assignment of papers to present, discussion on animal models of empathy, collaborative conception of review paper and research proposal (as example outlines for your term paper)

Reading:

-Langford et al, Social Modulation of Pain as Evidence for Empathy in Mice. Science. 2006; 312(5782):1967-70.

-Ben-Ami Bartal I et al. Empathy and Pro-Social Behavior in Rats Science. 2011; 334(6061):1427-30

February 5:

Intro: Nature and nurture - How much can we blame our parents for what's wrong with us? What about the environment in which we grew up? What are the mechanisms by which our environment can change us?

Reading:

-Caspi, A et al. Influence of life stress on depression: moderation by a polymorphism in the 5-5HTT gene. Science. 2003;301(5631):386-9.

-Weaver, ICG et al.Epigenetic programming by maternal behavior. Nature Neuroscience 2004; 7, 847-854

February 12:

Intro: Plasticity - How plastic is our brain? When and why does it change? What can we do to change it?

Reading:

-van Praag et al, Running enhances neurogenesis, learning, and long-term potentiation in mice. Proc Natl Acad Sci U S A. 1999 Nov 9;96(23):13427-31.

-Schmithorst et al, Differences in white matter architecture between musicians and non-musicians: a diffusion tensor imaging study. Neuroscience Letters 321 (2002) 57–60.

February 19:

Drug addiction - Why do we get addicted? Do some people have more 'addictive' personalities? Does our brain change when we're addicted? What are some strategies to curb addiction?

Reading:

-Naqvi et al, Damage to the Insula Disrupts Addiction to Cigarette Smoking. Science 2007: Vol. 315 no. 5811 pp. 531-534.

-Volkow et al, Cocaine Cues and Dopamine in Dorsal Striatum:Mechanism of Craving in Cocaine Addiction. The Journal of Neuroscience, 2006; 26(24):6583– 6588

February 26:

Obesity: Is there a neurobiological reason for why we're getting heavier? Are we addicted to food? How do the developed drugs help treat obesity? Can a pill be developed to cure obesity?

Reading:

-Stunkard et al, An Adoption Study of Human Obesity. N Engl J Med. 1986;314(4):193-8.

-Johnson & Kenny, Dopamine D2 receptors in addiction-like reward dysfunction and compulsive eating in obese rats Nature Neuroscience (2010) 13,635–641

March 5:

Gambling and video-game playing – Is a pathological gambling any different than drug addiction? Can we be addicted to video games? How different is compulsive gaming different from a cocaine addiction?

Reading:

-Reuter et al, Pathological gambling is linked to reduced activation of the mesolimbic reward system. Nature Neuroscience (2005) 8(2):147-8.

-Thalemann et al, Specific cue reactivity on computer game-related cues in excessive gamers. Behavioral Neuroscience (2007) 121(3) 614-618.

- Zeeb et al, Serotonergic and dopaminergic modulation of gambling behavior as assessed using a novel rat gambling task. Neuropsychopharmacology (2009) 34(10):2329-43

March 12:

Sexual attraction: Can sexual preference be "read out" in brain scans? What factors into who we find attractive?

Reading:

-Gelstein, et al. Human Tears Contain a Chemosignal. Science (2011) 331, 226-230.

-Tracy JL, Beall AT. Happy guys finish last: the impact of emotion expressions on sexual attraction. Emotion. 2011 Dec;11(6):1379-87.

-Haga et al. The male mouse pheromone ESP1 enhances female sexual receptive behaviour through a specific vomeronasal receptor. Nature. 2010;466(7302):118-22.

March 19: Spring break

March 26:

Sex differences - Are men from Mars and women from Venus? How different are the brains of males and females? What makes us act like men or women? Is there such a thing? If so, is it learned or pre-programmed?

Reading:

-Jacobson, CD et al. The influence of gonadectomy, androgen exposure, or a gonadal graft in the neonatal rat on the volume of the sexually dimorphic nucleus of the preoptic area. J Neurosci. 1981;1(10):1142-7.

-Quinn, JJ et al. Sex chromosome complement regulates habit formation. Nat Neurosci. 2007; 10(11):1398-400.

-Moss-Racusin et al. Science faculty's subtle gender bias favors male students. PNAS 2012 109(41):16474-9

April 2:

Sexual preference - When are sexual preference and sexually dimorphic behavior determined? Do we know of neural substrates that underlie differences in sexual orientation?

Reading:

-LeVay, A Difference in Hypothalamic Structure Between Heterosexual and Homosexual Men. Science 1991: Vol. 253 no. 5023 pp. 1034-7.

-Savic et al., Brain response to putative pheromones in homosexual men. Proc Natl Acad Sci USA. 2005; 102(20): 7356–7361.

April 9:

Well-being: Stress - Why am I so stressed out? What makes us different in our abilities to handle stress?

Reading:

-Stroud et al, Sex Differences in Stress Responses: Social Rejection versus Achievement Stress. Biol Psychiatry. 2002;52(4):318-27.

-Parker et al, Prospective Investigation of Stress Inoculation in Young Monkeys. *Arch Gen Psychiatry*. 2004;61(9):933-941.

-Romeo et al, Stress history and pubertal development interact to shape hypothalamic-pituitary-adrenal axis plasticity. Endocrinology. 2006;147(4):1664-74.

April 16:

Well-being: Immunity: Why do I get sick right after finals end? Why do some people get really cranky when they're sick? Do immunizations cause autism? What about the flu during pregnancy?

Reading:

-Cohen et al, Sociability and susceptibility to the common cold. Psychol Sci. 2003 Sep;14(5):389-95.

-Chiang et al, Negative and competitive social interactions are related to heightened proinflammatory cytokine activity. Proc Natl Acad Sci U S A. 2012 Feb 7;109(6):1878-82.

-Brown et al, Serologic Evidence of Prenatal Influenza in the Etiology of Schizophrenia. Arch Gen Psychiatry. 2004 Aug;61(8):774-80

April 23:

Well-being: The Mind-Body Connection: How does the placebo effect work? Can our mind control what our body does? Can we change our own brain?

Reading:

-Wager et al, Placebo-induced changes in FMRI in the anticipation and experience of pain. Science. 2004 Feb 20;303(5661):1162-7.

-Brefczynski-Lewis et al, Neural correlates of attentional expertise in long term meditation practitioners. Proc Natl Acad Sci U S A. 2007 Jul 3;104(27):11483-8.

-Mascaro JS et al, Compassion meditation enhances empathic accuracy and related neural activity. Soc Cogn Affect Neurosci. 2013;8(1):48-55.

April 30:

Recap: Presentations of Term Papers: Persuade the class of your opinion or convince the class that we should fund your research proposal (10 minutes max).