Syllabus
NEUROBIOLOGY OF EATING AND EATING DISORDERS
Psychology 388 – Fall 2012

Lectures: MWF at 2:00 in Campion Hall 300

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Course Description
The course will provide an overview of the neural mechanisms controlling appetite, eating, and body weight regulation under normal circumstances, and in eating disorders. The course is organized in three main parts. The first part of the course (topics 1-3) will review homeostatic/metabolic regulatory signals, and the underlying brain mechanisms. The next topics (4-6) will explore the role of non-metabolic (extrinsic or environmental) factors in the control of eating, and the neural systems that allow their integration with the homeostatic control. The final topics (7&8) of the course will review current neuroscience findings pertinent to obesity, and anorexia/bulimia nervosa. Findings from animal models will be the primary focus of the course, however human studies will be incorporated in many discussions.

Course Prerequisites
At least one of the following courses: PS285, PS381, PS382, PS383, PS385. It is assumed that all students have a basic knowledge of the nervous system.

Course website
The course website is accessible via Blackboard Vista (https://cms.bc.edu).

Readings
The course material draws upon current neuroscience findings, and there is no one textbook that adequately summarizes the up to date interdisciplinary material. A course pack and journal articles (reviews and primary articles) will be assigned, as indicated below. The course pack is available at the BC bookstore. The journal articles will be posted on the course website, and are also available through the electronic journal offerings of O'Neill Library, or PubMed when indicated (www.pubmed.gov). An important aspect of this course is to provide an opportunity for you to analyze, and discuss primary research articles. Please read the assignments and be prepared to discuss them in class.

1. Course Pack: N. R. Carlson: "Ingestive Behavior", Chapter 12 of Physiology of Behavior (2013), 11th Edition, Pearson.

2. Journal Articles will be assigned as listed in this syllabus, but may change. You will be notified of any changes at least one week in advance.

Course requirements

There will be three exams that will consist of multiple choice-, short answer-, and essay-type questions based on the material in the assigned readings and the class discussions. The exams will **not** be cumulative, and will include the material covered either since the beginning of the course (Exam 1), or since the last exam (Exam 2 & Exam 3). Make-up exams will only be given to individuals who are sick on the test day and provide Dean's approval.

Important Dates

- TEST 1: Friday, October 5th
- No Class: Monday, October 8th –Columbus Day
- No Class: Monday, Oct 15th or Wednesday, Oct 17th –Society for Neuroscience Meeting
- No Class: Wednesday, November 21st or Friday, November 23rd –Thanksgiving Break
- TEST 2: Monday, November 12th
- Last Lecture: Monday, December 10th
- TEST 3 (Final Exam): Wednesday, Dec 19th at 12:30 p.m.

Grading

Grading is allocated as follows:

Assignment	*Percentage of final grade*
Exam 1	30%
Exam 2	30%
Exam 3	30%
Class Participation	10%

Final averages will be graded as follows:

A	93-100	B	83-86	C	70-74	D	55-59
A-	90-92	B-	80-82	C-	65-69	D-	50-54
B+	87-89	C+	75-79	D+	60-64	F	<50

Learning disabilities

If you have a disability and will be requesting accommodations for this course, please register with Kathy Duggan [kathleen.duggan@bc.edu], Associate Director, Academic Support Services, The Connors Family Learning Center (learning disabilities and ADHD) or Suzy Conway [suzy.conway.1@bc.edu], Assistant Dean for Students with Disabilities (all other disabilities). Advance notice and appropriate documentation are required for accommodations.

Academic Integrity

Please review the academic integrity policy of BC at:
http://www.bc.edu/schools/cas/polisci/integrity.html

NEUROBIOLOGY OF EATING AND EATING DISORDERS: READINGS

Topic 1: **Introduction**

1. Carlson NR, Chapter 12 of Physiology of Behavior (2013), 11th Edition, Pearson (Course Pack), pp. 394-395.
2. Berridge KC (2004). Homeostasis and drives (pp. 179-186) In: Motivation Concepts in Behavioral Neuroscience. Physiology & Behavior 81:179-209.
3. Levitsky DA (2005). The non-regulation of food intake in humans: hope for reversing the epidemic of obesity. Physiology & Behavior 86:623-32.

Topic 2: **Homeostatic/Metabolic Signals**

1. Carlson NR, Chapter 12 of Physiology of Behavior (2013), 11th Edition, Pearson (Course Pack), pp. 403-413.
2. Woods SC (2005). Signals that influence food intake and body weight. Physiology & Behavior 86: 709-716.
3. Coleman DL. (1973). Effects of parabiosis of obese with diabetes and normal mice. Diabetologia 9:294-298.

Additional not required readings:

4. Spiegel TA, Kaplan JM, Tomassini A, Stellar E. (1993). Bite size, ingestion rate and meal size in lean and obese women. Appetite. 21:131-145.

Topic 3: **Central Nervous System Control: Brainstem and Hypothalamus**

1. Carlson NR, Chapter 12 of Physiology of Behavior (2013), 11th Edition, Pearson (Course Pack), pp. 414-420.
2. Grill HJ. Distributed neural control of energy balance: contributions from hindbrain and hypothalamus. (2004). Obesity. Suppl 5:216S-221S.
3. Elmquist JK, Elias CF, Saper CB. (1999). From lesions to leptin: hypothalamic control of food intake and body weight. Neuron. 22:221-32.
4. Schwartz MW, Woods SC, Porte D Jr, Seeley RJ, Baskin DG. (2000). Central nervous system control of food intake. Nature. 404:661-71.
5. Flood JF, Morley JE. (1991). Increased food intake by neuropeptide Y is due to an increased motivation to eat. Peptides 12:1329-1332.

Additional not required readings:

6. Stanley BG, Chin AS, Leibowitz SF. (1985). Feeding and drinking elicited by central injection of neuropeptide Y: evidence for a hypothalamic site(s) of action. Brain Res Bull. 14:521-4.
7. Stanley BG, Kyrkouli SE, Lampert S, Leibowitz SF. (1986). Neuropeptide Y chronically injected into the hypothalamus: a powerful neurochemical inducer of hyperphagia and obesity. Peptides 7:1189-1192.

Topic 4: **Non-Homeostatic/Non-Metabolic Signals**

1. Stroebele N, De Castro JM. (2004). Effect of ambience on food intake and food choice. Nutrition. 20:821-38.

2. Woods SC, Ramsay DS. (2000). Pavlovian influences over food and drug intake. Behav Brain Res. 110:175-82.
3. Birch LL, McPhee L, Sullivan S, Johnson S. (1989). Conditioned meal initiation in young children. Appetite. 13:105-13.
4. Petrovich GD, Setlow B, Holland PC, Gallagher M. (2002). Amygdalo-hypothalamic circuit allows learned cues to override satiety and promote eating. J Neurosci. 22(19):8748-53.
Additional not required readings:
5. Berthoud HR. (2006). Homeostatic and non-homeostatic pathways involved in the control of food intake and energy balance. Obesity. 14 Suppl 5:197S-200S.

Topic 5: **Emotion, Stress and Eating**

1. Macht M, Mueller J. (2007) Immediate effects of chocolate on experimentally induced mood states. Appetite. 49:667-74.
2. Schroeder BE, Binzak JM, Kelley AE. (2001). A common profile of prefrontal cortical activation following exposure to nicotine- or chocolate-associated contextual cues. Neuroscience. 105:535-45.
3. Killgore WD, Yurgelun-Todd DA. (2006). Affect modulates appetite-related brain activity to images of food. Int J Eat Disord. 39:357-63.
4. Epel E, Lapidus R, McEwen B, Brownell K. (2001). Stress may add bite to appetite in women: a laboratory study of stress-induced cortisol and eating behavior. Psychoneuroendocrinology. 26:37-49.
5. Pecoraro N, Reyes F, Gomez F, Bhargava A, Dallman MF. (2004). Chronic stress promotes palatable feeding, which reduces signs of stress: feedforward and feedback effects of chronic stress. Endocrinology. 145:3754-62.
6. Peciña S, Schulkin J, Berridge KC. (2006) Nucleus accumbens corticotropin-releasing factor increases cue-triggered motivation for sucrose reward: paradoxical positive incentive effects in stress? BMC Biol. 4:8. *Available through PubMed (www.pubmed.gov).
Additional not required readings:
7. Dallman MF, Pecoraro NC, la Fleur SE. (2005). Chronic stress and comfort foods: self-medication and abdominal obesity. Brain Behav Immun. 19:275-80.

Topic 6: **Food and Reward**

1. Harris GC, Aston-Jones G. (2006). Arousal and reward: a dichotomy in orexin function. Trends Neurosci. 29:571-7.
2. Kelley AE, Bakshi VP, Haber SN, Steininger TL, Will MJ, Zhang M. (2002). Opioid modulation of taste hedonics within the ventral striatum. Physiol Behav. 76:365-77.
3. Fulton S, Woodside B, Shizgal P. (2000). Modulation of brain reward circuitry by leptin. Science. 287(5450):125-8
4. Farooqi IS, Bullmore E, Keogh J, Gillard J, O'Rahilly S, Fletcher PC. (2007). Leptin regulates striatal regions and human eating behavior. Science. 317:1355.
Additional not required readings:
5. Volkow ND, Wang GJ, Maynard L, Jayne M, Fowler JS, Zhu W, Logan J, Gatley SJ, Ding YS, Wong C, Pappas N. (2003). Brain dopamine is associated with eating behaviors in humans. Int J Eat Disord. 33:136-42.

6. Small DM, Zatorre RJ, Dagher A, Evans AC, Jones-Gotman M. (2001). Changes in brain activity related to eating chocolate: from pleasure to aversion. Brain. 124:1720-33.
7. Pelchat ML, Johnson A, Chan R, Valdez J, Ragland JD. (2006). Images of desire: food-craving activation during fMRI. Neuroimage. 23:1486-93.

Topic 7: **Eating Disorders I: Obesity, Environment and Addiction Mechanisms**

1. Carlson NR, Chapter 12 of Physiology of Behavior (2013), 11th Edition, Pearson (Course Pack), pp. 420-428.
2. Hill JO, Wyatt HR, Reed GW, Peters JC. (2003). Obesity and the environment: where do we go from here? Science. 299:853-5.
3. Schachter S. (1968). Obesity and eating. Internal and external cues differentially affect the eating behavior of obese and normal subjects. Science. 161:751-6.
4. Wansink B, Payne CR, Chandon P. (2007). Internal and external cues of meal cessation: the French paradox redux? Obesity. 15:2920-4. *Available via: foodpsychology.cornell.edu.
5. Volkow ND, Wise RA. How can drug addiction help us understand obesity? (2005). Nat Neurosci. 8:555-60.
6. Avena NM, Rada P, Hoebel BG (2008) Evidence for sugar addiction: behavioral and neurochemical effects of intermittent, excessive sugar intake. Neurosci Biobehav Rev. 32:20-39.

Topic 8: **Eating Disorders II: Neurobiology of Anorexia and Bulimia Nervosa**

1. Carlson NR, Chapter 12 of Physiology of Behavior (2013), 11th Edition, Pearson (Course Pack), pp. 428-432.
2. Klein DA, Walsh BT. (2004). Eating disorders: clinical features and pathophysiology. Physiol Behav. 81:359-374.
3. Jimerson DC, Wolfe BE. (2006). Psychobiology of eating disorders. In Annual Review of Eating Disorders part 2-2006, pp. 1-15.*Social Work Library Stacks RC552 .E18 E2865
4. Jimerson DC, Mantzoros C, Wolfe BE, Metzger ED. (2000). Decreased serum leptin in bulimia nervosa. J Clin Endocrinol Metab. 85:4511-4.
5. Seeger G, Braus DF, Ruf M, Goldberger U, Schmidt MH. (2002). Body image distortion reveals amygdala activation in patients with anorexia nervosa –a functional magnetic resonance imaging study. Neurosci Lett. 326:25-8.
6. Friederich HC, Uher R, Brooks S, Giampietro V, Brammer M, Williams SC, Herzog W, Treasure J, Campbell IC. (2007). I'm not as slim as that girl: neural bases of body shape self-comparison to media images. Neuroimage. 37(2):674-81.

Additional not required readings:

7. Kaye W. (2008). Neurobiology of anorexia and bulimia nervosa. Physiol Behav. 94:121-35.
8. Becker AE, Burwell RA, Gilman SE, Herzog DB, Hamburg P. (2002). Eating behaviours and attitudes following prolonged exposure to television among ethnic Fijian adolescent girls. Br J Psychiatry. 180:509-14.
9. Shapiro S, Newcomb M, Loeb TB. (1997) Fear of fat, disregulated-restrained eating, and body-esteem: prevalence and gender differences among eight- to ten-year-old children. J Clin Child Psychol. 26(4):358-65.
10. Young SN. (2007). How to increase serotonin in the human brain without drugs. J Psychiatry Neurosci. 32(6):394-9.