

**NUTB 242: Obesity and Energy
Regulation
Spring 2019**

Class Meetings: *Residency*
- 5:30-7:30pm on Wednesday, January 30th 2019
- 8am-12:15pm on Thursday, January 31st 2019
Online as outlined in schedule

Instructors: Sai Krupa Das, Ph.D.
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Instructors Office Hours: *Office hours online (Skype voice or by Skype IM) by appointment*

Semester Hour Units: 0.5

Prerequisites: A course in general nutrition and another in nutritional biochemistry (macronutrients)

Course Description: Obesity is an epidemic in some countries and is a global public health issue. Students in this course will have the opportunity to gain an understanding in the basics of energy regulation in obesity as it relates to factors controlling food intake. Coverage includes the role of energy density of foods, eating behavior, sensory and hedonic inputs, metabolic influences on the controls of meal size, environmental and energy expenditure influences on energy balance and body weight and current perspectives and controversies concerning exercise as well as possible strategies for obesity prevention and treatment. Childhood obesity and specifics that pertain to children will be briefly discussed. The course will integrate examples of community, clinical and public health policy applications. Published journal articles from the peer reviewed literature that are topical and current, “real-time online lectures or meeting proceedings” and media reports will be included as part of the

critical review and discussions each week. This course will be offered in the first half of the spring semester.

Course Objectives: At the end of this course students will be able to:

- Summarize the key players in energy regulation and body weight in the general population.
- Integrate behavioral and biological findings relating to energy regulation and body weight
- Compare hedonic and homeostatic central and peripheral mechanisms relevant to obesity
- Explain some of the strengths and limitations of the scientific evidence relating to diet and exercise as it relates to energy regulation
- Critically assess options for the management of obesity
- Comprehend and dissect the components of research articles and critique peer reviewed published journal articles.
- Translate and communicate this body of knowledge to the public.
- Identify areas of potential collaboration between biologists, nutritionists and social scientists in successfully addressing the obesity epidemic nationally and worldwide.

Texts or Materials: *Obesity, Causes, Mechanisms, Prevention and Treatment*

Edited by Elliott M. Blass

Sinauer Associates Inc. Sunderland, MA 01375

Purchase not mandatory

Obesity and Energetics Offerings sign-up required

<https://www.obesityandenergetics.org>

Academic Conduct: Each student is responsible for upholding the highest standards of academic integrity, as specified in the [Friedman School's Policies and Procedures Handbook](#) and Tufts University policies (<http://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy>). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

Classroom Conduct:

Attendance Policy

Upon joining this Master of Nutrition Science and Policy degree program, you become a member of a cohort, a learning group. Hopefully you will find the group experience provides you with a tremendous support system, a rich learning environment, and a long lasting

network of colleagues to learn with and from. Your consistent and complete participation is an essential and necessary component to the group's success. Absences jeopardize the academic integrity of the program as well as the quality of you and your colleague's learning experiences. Therefore, please arrange to be present at all residency sessions during this third term. If you miss any time, documentation in writing is required in advance. Every hour of missed residency time may lower your final grade by 2%. Time extensions, make-up work, and a grade of incomplete will only be given under the most extreme circumstances. Requests for these items must be made in advance, in writing, to the Dean for Academic Affairs and must have prior approval, in writing, of the academic adviser and the instructor.

Communication Policy

Students should seek out information themselves, and from the class site. If you do not find your answer contact the instructors as soon as possible. Please do not wait. Instructors will answer within 48 hours. It is your responsibility to contact the instructor immediately if you have, suspect or anticipate any issues or questions regarding course content, assignments and due dates. If you have, suspect or anticipate technical difficulties, it is your responsibility to contact technical support immediately. Communication and anticipation of issues is vital due to the distance nature of this course.

Technical Support

Please follow standard guidelines for MNSP. Students should contact technical support for technical issues; faculty should not be contacted for technical support.

Assessment and Grading: *The following guidelines are used in evaluating course performance:*

1. Mini assignments will be evaluated on the basis of completeness, originality, scientific soundness and relevance to the assigned topic, as well as adherence to due dates.
2. All written work including mini assignments will be evaluated on the quality of thought, completeness, adherence to guidelines, scientific integrity, and ability to incorporate and communicate ideas and information effectively.
3. Adherence to instructions and guidelines of the assignments is critical.
4. Attendance at all in-person class sessions. Please see the Attendance Policy. Missed time will affect your grade unless prior arrangements were requested and approved in writing by the instructors for make-up work.
5. Student term paper guidelines will be provided via email after the course is opened.

Grading Range: A grade of A is excellent, and is defined as far and above the stated requirements for the given assignment. B is defined such that the student met the basic requirements. C is less than adequate. Grades less than C are considered a failure. You must have a grade average of 3.0 (B) to receive a degree from the Friedman School. Grades will be posted throughout the semester in the course Gradebook in Canvas, our Learning Management System.

Grading for the course will be based on the below distribution:

One take-home term paper	25%
Mini Assignments 1-4	40%
Residency attendance and all class preparedness	10%
Residency group discussions	25%

Instructions for Submission of Assignments and Term Paper: All assignments received after their deadline will not be accepted or graded unless extension is approved in advance. Students who are unable to complete an assignment or term paper on time for any reason should notify the instructor by email prior to the deadline, with a brief explanation for why the extension is needed.

Readings, Activities & Discussions

Please refer to the CANVAS course site for all reading assignments, which will be listed under each module. *For specific information and directions on how to do the assignments and what is due, please go to "Assignments" in your Canvas course site.*

Exams in Canvas

If you have an exam you should anticipate problems and it is strongly recommended that you take the exam during hours where there is technical support available Monday through Friday 9 am - 5pm Boston time (Eastern Time). If your computer goes down or Canvas goes down for some reason during your exam, the timer will continue to run in Canvas. Go back into Canvas and back into the exam. The time will have continued to count down, but it will have saved your answers to the point you lost access. If you continue to have difficulty, shut down your computer and go back in again. If still you have difficulty, contact technical support Monday through Friday 9 am - 5pm (Eastern Time).

Accommodation of Disabilities: University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to make arrangements for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

Tufts WebEx: Friedman's on-campus courses during the residency may be offered by Tufts WebEx (<https://it.tufts.edu/webex>) on days when the Boston campus is closed due to weather or a temporary cancellation issue. Students should expect to be notified by email in the event that class is cancelled and will be provided with the WebEx link for students to use for any remote class sessions. Also, any relevant course slides or materials will be made available on Canvas. The WebEx will be recorded and posted on Canvas when completed. If an on-campus Examination/Presentation was scheduled on a day when the Boston campus is closed due to weather or a temporary cancellation issue, the exam/presentation will be rescheduled for an alternate on-campus class session date.

Diversity Statement: We believe that the diversity of student experiences and perspectives is essential to the deepening of knowledge in this course. We consider it part of our responsibility as instructors to address the learning needs of all of the students in this course. We will present materials that are respectful of diversity: race, color, ethnicity, gender, age, disability, religious beliefs, political preference, sexual orientation, gender identity, socioeconomic status, citizenship, language, or national origin among other personal characteristics.

Course Topics and Assignment Schedule at a Glance:

Date	Time	Week	Topic	Instructor	Assignment
Review Material To Cover On your Own					
Jan 21 – Jan 27	Pre-Week 1	Online Lecture	Epidemiology of Obesity	Hurby	
Course Begins					
Jan 28 – Feb 3	Week 1 Residency	1/30/2019	Energetics of Overeating and Obesity	Das	
		1/31/2019	Student Discussions Factors Controlling Food Intake- Dietary, Sensory and Hedonic	Das Taetzsch Roberts	Student energetic discussions
Feb 4 – 10		Week 2	Metabolic Control of Energy Intake–Central and Peripheral Controls	Felsted	Assignment 1 due 2/11 at 12pm EST
Feb 11 – 17		Week 3	Framework for Obesity Treatment	Siegel Taetzsch	Webinar: 6pm on February 13 th , 2019 Assignment 2 due 2/18 at 12pm EST
Feb 18 – Feb 24		Week 4	Exercise and Environmental Regulators of Energy Metabolism	Taetzsch	Assignment 3 due 2/25 at 12pm EST
Feb 25 –Mar 3		Week 5	Childhood Obesity	Hennessy	Assignment 4 due 3/4 at 12pm EST
Mar 4-17		Week 6	Reading Period		
Mar 18			Take home term paper due date		Submit by 11:59pm on 3/18

Detailed Description of Course Topics, Assignment Schedule, and the Learning Objectives for Each Class Session:

Pre-Week 1: The Epidemiology of Obesity

Student Learning Objectives: Students will review this lecture on their own. This overview is designed to help students gain an understanding of the current epidemic, the role of sociological and psychological factors contributing to obesity in diverse populations and the health effects of excess weight including the health cost burden of obesity treatment. Students will explore the issues relating to public policy about the biological, behavioral, and sociological correlates of the obesity epidemic and efforts undertaken to understand and control the obesity epidemic through national and international public policy.

Required Readings:

- 1) Hruby, A., & Hu, F. B. (2015). The epidemiology of obesity: a big picture. *Pharmacoeconomics*, 33(7), 673-689.

Supplemental Readings / Lecture:

- 1) The Epidemiology of Obesity—Causal Roots and Roots of Cause. Blass, Chapter 2 pages 19-72
- 2) What is Obesity: Epidemiology by Alexandra Blakemore, PhD

Week 1: Energetics of Overeating and Obesity (Wednesday January 30th, 2019)

Student Learning Objectives: This class will provide a deeper understanding of the role of macronutrients in the development of obesity. The metabolic consequences of excess energy intake and weight gain will be examined. Energy metabolism in the obese will be examined from the perspective of the components of total energy expenditure and how each compartment is handled in obesity.

Required Readings:

- 1) Hall, K. D., et al. (2012). Energy balance and its components: implications for body weight regulation. *The American journal of clinical nutrition*, 95(4), 989-994. Energy expenditure is very high in extremely obese women. Das SK, et al. *J Nutr* 2004;134:1412-1416. PMID: 15173405
- 2) Thom G and Lean M.(2017). Is there an Optimal Diet for Weight Management and Metabolic Health? *Gastroenterology*;152(7):1739-1751

Supplemental Readings:

- 1) Le Couteur DG, Solon-Biet S, Cogger VC, Mitchell SJ, Senior A, de Cabo R, Raubenheimer D, Simpson SJ. (2016). The impact of low-protein high-carbohydrate diets on aging and lifespan. *Cellular and Molecular Life Sciences*. 73(6):1237-1252

- 2) Rolls, B. J. (2012). Dietary strategies for weight management. *Obesity Treatment and Prevention: New Directions* (Vol. 73, pp. 37-48). Karger Publishers.
- 3) Jonge, L., et al. (2012). Effect of diet composition and weight loss on resting energy expenditure in the POUNDS LOST study. *Obesity*, 20(12), 2384-2389.

Week 1: Student led energetic discussions (Thursday January 31st, 2019): please see CANVAS for more details.

Week 1: Factors Controlling Food Intake - Dietary, Sensory and Hedonic (Thursday January 31st, 2019)

Student Learning Objectives: This class will provide an in-depth review of the various dietary factors implicated in the control of food intake. By integrating behavioral and biological findings from humans and animal models of obesity the relationship between eating, energy balance and weight will be examined. Sensory and hedonic inputs will be introduced to provide the background for the subsequent class where the gut brain components are linked.

Required Readings:

- 1) Garrison, J. L., & Knight, Z. A. (2017). Linking smell to metabolism and aging. *Science*, 358(6364), 718-719.
- 2) Epstein, L. H., Carr, K. A., Lin, H., & Fletcher, K. D. (2011). Food reinforcement, energy intake, and macronutrient choice. *The American journal of clinical nutrition*, 94(1), 12-18.

Supplemental Readings:

- 1) Blass, E. M. (Ed.). (2008). *Obesity: Causes, mechanisms, prevention, and treatment*. Sinauer Associates Incorporated. Chapter 3, pp 73-76 and Chapter 7, pp 211-35.
- 2) Bewick, G. A. (2012). Bowels control brain: gut hormones and obesity. *Biochimica medica: Biochimica medica*, 22(3), 283-297.
- 3) Baladi, M. G., Daws, L. C., & France, C. P. (2012). You are what you eat: influence of type and amount of food consumed on central dopamine systems and the behavioral effects of direct- and indirect-acting dopamine receptor agonists. *Neuropharmacology*, 63(1), 76-86.
- 4) Foreyt, J. P., Salas-Salvado, J., Caballero, B., Bulló, M., Gifford, K. D., Bautista, I., & Serra-Majem, L. (2009). Weight-reducing diets: are there any differences? *Nutrition reviews*, 67(suppl_1), S99-S101.

Week 2: Metabolic Control of Energy Intake – Central and Peripheral Controls

Student Learning Objectives: With this class students will appreciate the link between meals as units of energy intake, the control of meal termination and the mediation of metabolic signals associated with food ingestion. Hedonic and homeostatic central mechanisms relevant to

obesity and the cross talk between central and peripheral signals will be reinforced. Short and long-term controls of food intake will be examined with an intent to provide a complete understanding of the gut brain signaling and how these signals influence energy intake.

Required Readings:

- 1) Monteiro MP & Batterham RL. (2017). The Importance of the Gastrointestinal Tract in Controlling Food Intake and Regulating Energy Balance. *Gastroenterology*. 152(7):1707-1717
- 2) Ziauddeen H, Alonso-Alonso M, Hill JO, Kelley M, Khan NM. (2015). Obesity and the Neurocognitive Basis of Food Reward and the Control of Intake. 6(4):474-486
- 3) Patterson RE & Sears DD. (2017). Metabolic Effects of Intermittent Fasting. *Annual Review of Nutrition*. 37:371-393

Supplemental Readings:

- 1) Varady KA et al. Determinants of weight loss success with alternate day fasting. *Obesity Research & Clinical Practice* (2015), 8–12.
- 2) Seimon RV et al. Do intermittent diets provide physiological benefits over continuous diets for weight loss? A systematic review of clinical trials. *Molecular and Cellular Endocrinology* (2015), 418, 153–172.

Assignment 1: Based on an article that is current from the “obesity and energetics offerings website”(<https://www.obesityandenergetics.org/>) and is on a topic related to “central or peripheral control of food intake”—students will be asked to provide a brief critical review and emphasize the strengths and limitations of the journal article’s study design and interpretation.

Week 3: Framework for Obesity Treatment

Student Learning Objectives: Obesity prevention efforts that are currently underway as well treatment options/modalities will be reviewed. Students will be able to discuss the latest efforts in obesity management by life coaches and clinical practitioners.

Required Readings:

- 1) Erlandson M, Ivey LC, and Seikel K. (2016). Update on Office-Based Strategies for the Management of Obesity. *American Family Physician*, 94(5):361-368.
<http://www.aafp.org/afp/2016/0901/p361.html>
- 2) Butryn ML, Webb V, and Wadden TA. (2011) Behavioral Treatment of Obesity. *Psychiatric Clinics of North America*, 34(4); 841-859. <https://dx.doi.org/10.1016%2Fj.psc.2011.08.006>

Supplementary Readings:

- 1) Blass, E. M. (Ed.). (2008). *Obesity: Causes, mechanisms, prevention, and treatment*. Sinauer Associates Incorporated. Chapter 13 (pp 399-421)
- 2) Johansson, K., Neovius, M., & Hemmingsson, E. (2013). Effects of anti-obesity drugs, diet, and exercise on weight-loss maintenance after a very-low-calorie diet or low-calorie diet: a systematic review and meta-analysis of randomized controlled trials. *The American journal of clinical nutrition*, 99(1), 14-23.

Assignment 2: If you were in an obesity and weight management clinic and were approached by a patient who is interested in weight control, how would you manage the expectations of your patient. Using a flow chart walk the patient through the various options he/she may have available to managing their weight.

Week 4: Exercise and Environmental Regulators of Energy Metabolism

Student Learning Objectives: This class will cover discussions on energy expenditure and weight regulation. The foundations of energy expenditure and current physical activity recommendations will be discussed. The role of physical activity and exercise in weight loss, weight maintenance, and weight management as well as the fuel utilization during exercise will be examined.

Required Readings:

- 1) Petridou A, Siopi A, Mougios V (2018). Exercise in the management of obesity. *Metabolism*, In press.
- 2) Herrmann, S. D., et al. (2015). Energy intake, nonexercise physical activity, and weight loss in responders and nonresponders: The Midwest Exercise Trial 2. *Obesity*, 23(8), 1539-1549.

Supplementary Readings:

- 1) Physical Activity Guidelines for Americans, 2nd Edition.
https://health.gov/paguidelines/second-edition/pdf/PAG_ExecutiveSummary.pdf
- 2) Ng, S. W., & Popkin, B. M. (2012). Time use and physical activity: a shift away from movement across the globe. *Obesity Reviews*, 13(8), 659-680.
- 3) Katzmarzyk, P. T., & Lear, S. A. (2012). Physical activity for obese individuals: a systematic review of effects on chronic disease risk factors. *Obesity Reviews*, 13(2), 95-105.

Assignment 3: In this week's lectures, we learned that high carbohydrate diets replete glycogen stores following physical activity. However, is there any benefit of following a low carbohydrate diet for energy regulation in terms of exercise? Support your position using the current literature in 500 words or less and cite your references.

Week 5: Childhood Obesity

Student Learning Objectives: Obesity among children and adolescents will be reviewed by examining the potential contributing factors. The impact of excess energy intake and inadequate energy expenditure in relation to childhood weight will be discussed in greater detail. Interventions for the prevention of obesity will be discussed with an emphasis on community-based efforts.

- To identify the factors that contribute to childhood obesity
- To examine the impact of energy intake and energy expenditure in relation to childhood weight
- To describe multilevel intervention strategies for the prevention of childhood obesity

Required Readings:

- 1) Bleich SN, Ku R, Wang YC. 2011. Relative contribution of energy intake and energy expenditure to childhood obesity: a review of the literature and directions for future research. *International Journal of Obesity*, 35, 1–15. doi:10.1038/ijo.2010.252
- 2) Weihrauch-Blüher S et al. 2018. Current Guidelines for Obesity Prevention in Childhood and Adolescence. *Obes Facts*;11:263–276. DOI: 10.1159/000486512
- 3) Sahoo K et al. 2015. Childhood obesity: causes and consequences. *J Family Med Prim Care*. 2015 Apr-Jun; 4(2): 187–192. doi: [10.4103/2249-4863.154628](https://doi.org/10.4103/2249-4863.154628).
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4408699/>

Supplemental Readings:

- 1) Hennessy E, Korn A, Economos CD. 2019. A Community-Level Perspective for Childhood Obesity Prevention. Chapter 26. In: *Global Perspectives on Childhood Obesity. 2nd Edition. Current Status, Consequences and Prevention* (Ed. Bagchi, D.).
- 2) Treatment of Obesity and Overweight in Children and Adolescents, Chapter 3. National Academies of Sciences, Engineering, and Medicine 2017. *The Challenge of Treating Obesity and Overweight: Proceedings of a Workshop*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24855>.

Assignment 4: Based on your understanding of the role of various potential players in childhood obesity, summarize your response using no more than 500 words on what you think are the important energetic factors that influence excessive intake and childhood weight gain. Support your views using critical thinking and professional judgment

Week 6: Term Paper (Due March 18th, 2019): please see CANVAS for more details