NUTB 243 – Nutrition, Brain & Behavior

Tufts University, Friedman School of Nutrition Science and Policy
Fall 2020

Instructor: Grace E. Giles, PhD
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Graduate Credits: 1.5 Semester hour units (SHUs)
Prerequisites: NUTB 205 and NUTB 305, or permission of instructor

Course Description: This course examines the bidirectional relationship between food consumption and human behavior, i.e. how our dietary choices influence behavior and vice versa. The semester will be divided into two components: (1) how nutrition impacts the brain and behavior and (2) how cognitions impact food choice and intake. Topics to be discussed during the semester include how macronutrients (carbohydrate, protein, fat) and micronutrients (vitamins and minerals) influence brain function, as well as how we choose how much and what to eat, and in relation to normal and "disordered" eating.

Course Objectives:

- **Critically read peer-reviewed articles:** By this point in your graduate career, you likely have experience reading and interpreting peer-reviewed articles. In this course, you will build on this skill by analyzing individual articles for strengths and weaknesses beyond those stated in the Discussion section, and learn how to synthesize the findings from a particular area of interest.
- **Become a jack of all trades, and a master of one:** In order to get a taste of the scope of research in the field of nutrition and behavior, you will read articles on a variety of topics, ranging from caffeine and cognitive performance to eating disorders and food restriction. You will also choose one topic you find interesting and delve into it in more depth.
- **Actively discuss research:** Much of the class will be discussion-based in the form of online forums. Be prepared to voice your thoughts, ideas, and criticisms about the readings.

Texts and Materials:

The required textbook is Nutrition and Behavior: A Multidisciplinary Approach, 2nd Edition, by Worobey, Tepper, and Kanarek, ©2015.

An optional textbook, suggested for anyone without a psychology background (e.g. who have not taken an introduction to psychology undergraduate course) is *Psychological Science*, Fifth Edition, by Gazzaniga, Heatherton, and Halpern. It is printed in 2016 by W. W. Norton, and used copies are available from online booksellers.

For updated information on mental health disorders, we will use the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. It is available at:
http://dsm.psychiatryonline.org/doi/book/10.1176/appi.books.9780890425596.

Additionally, other readings and materials will be available online via Canvas.

Academic Conduct: Each student is responsible for upholding the highest standards of academic integrity, as specified in the Friedman School's Policies and Procedures manual (http://nutrition.tufts.edu/student/documents) and Tufts University policies (http://uss.tufts.edu/studentaffairs/judicialaffairs/Academic Integrity.pdf). 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.

Assessment and Grading:
Your grade will be based on the percentage of points, out of 300, that you can earn. The points are divided as follows:

Discussion Forums	20 points each (120 points)
Research Presentation "Quiz"	60 points
Final Project	120 points

A standard 10-point percentage grade scale will be used (90-100% = A, 80-89% = B, etc.), with separations for + and –s within this. Assignments will not be graded unless extension is approved in advance. Students who are unable to complete an assignment exam on time for any reason should notify the instructor by email, text message or phone call prior to the deadline, with a brief explanation for why the extension is needed.

Grade Reconsideration: All assignments will be graded with great care as it is important to me (and to you!) that your scores reflect a valid estimate of your performance. Requests for reconsideration should be rare and only based on substantial evidence that the original score was invalid. In the event that you decide to make such a request, please note that it may be made *no earlier than 24 hours and no later than 1 week* after we post your grade. You must submit a written request (by email) indicating your rationale for why more points should be awarded, and (if applicable) a textbook page # or lecture as supporting evidence.

Assignment and Submission Instructions:
1. Discussion Forums. The discussion forums will be two-part. The primary post will consist of thoughtfully answering a question pertaining to the weekly topic, similar to a response paper. Primary posts should be equivalent to two size-12 font, double-spaced pages. The primary post will help you to think about the research critically and provide the framework to further discussion. They must demonstrate your knowledge of *both* lecture and reading material. Primary posts will be due Thursday by midnight each week. The secondary posts (minimum two) will consist of responding to other students' primary posts. Secondary posts will be due Sunday by midnight each week. Forum posts must demonstrate understand of both lecture and readings.

2. Research Presentation "Quiz": Each student will be assigned a research article and prepare a 5-minute talk to tell the class about the research. The purpose of this "quiz" is to provide a thumbnail sketch of the experiment and how the work illustrates psychology concept(s).

3. Final Project: Popular Press Analysis and Presentation: The final project is a three-part assignment in which you (1) choose topic in the popular press, e.g. red wine reduces Alzheimer's Disease symptoms, (2) perform a literature review of peer-reviewed articles looking at this topic, and (3) present your findings to the class. Importantly, you will decide whether the scientific evidence supports the popular presses' claims.

Accommodation of Disabilities: Tufts 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.

Course Schedule:

***This schedule is subject to modification at the instructor's discretion.**

Date	**Topic**	**Graded Assignments**
9/8-9/13	Introduction to Nutrition and Behavior & Behavioral Science	
How does nutrition affect your brain and behavior?		
9/14-9/20	Macronutrients + Overview of Cognition and Emotion	Discussion Forum #1
9/21-9/27	Vitamins and Minerals + Overview of Learning and Memory	Discussion Forum #2
9/28-10/4	Direct Effects of Nutrition on the Brain + Overview of Central Nervous System Structure and Function *(Includes Residency)*	Research Presentation "Quiz"
10/5-10/11	Functional Foods and Nutritional Supplements	Discussion Forum #3 Final Project Article Choice
How does your brain and behavior affect your nutrition?		
10/12-10/18	Satiety and Food choice	Discussion Forum #4
10/19-10/25	Eating Disorders and Obesity	Discussion Forum #5 Final Project Literature Review
10/26-11/1	Final Project	Discussion Forum #6 Final Project Product

Forum Rubric

Category	Unacceptable	Below Average	Acceptable	Excels
Initiative and Promptness 4 points	Does not respond to most postings; rarely participates freely 0 points	Responds to most postings several days after initial discussion; limited initiative 2 points	Responds to most postings within a 24 hour period; requires occasional prompting to post 3 points	Consistently responds to postings in less than 24 hours; demonstrates good self-initiative 4 points
Delivery of Post **A) Quality** **B) Quantity** **2 points per item**	A) Utilizes poor spelling and grammar in most posts; posts appear "hasty" B) Posts are brief and random* 0 points per item	A) Errors in spelling and grammar evidenced in several posts B) Posts are brief and don't reflect thoughtfulness or insight .5 points per item	A) Few grammatical or spelling errors are noted in posts B) Posts frequently of sufficient length to reflect thoughtfulness or insight 1.5 points per item	A) Consistently uses grammatically correct posts with rare misspellings B) Post are consistently of sufficient length to reflect thoughtfulness or insight 2 points per item
Relevance of Post **4 points**	Posts topics which do not relate to the discussion content; makes short or irrelevant remarks 0 points	Occasionally posts off topic; most posts are short in length and offer no further insight into the topic 2 point	Frequently posts topics that are related to discussion content; prompts further discussion of topic 3 points	Consistently posts topics related to discussion topic; cites additional references related to topic 4 points
Category	**Unacceptable**	**Below Average**	**Acceptable**	**Excels**
Expression Within the Post **4 points**	Does not express opinions or ideas clearly; no connection to topic 0 points	Unclear connection to topic evidenced in minimal expression of opinions or ideas 2 points	Opinions and ideas are stated clearly with occasional lack of connection to topic 3 points	Expresses opinions and ideas in a clear and concise manner with obvious connection to topic 4 points
Contribution to the Learning Community **4 points**	Does not make effort to participate in learning community as it develops; seems indifferent 0 points	Occasionally makes meaningful reflection on group's efforts; marginal effort to become involved with group 2 points	Frequently attempts to direct the discussion and to present relevant viewpoints for consideration by group; interacts freely 3 points	Aware of needs of community; frequently attempts to motivate the group discussion; presents creative approaches to topic 4 points

* Students are expected to meet the sufficient number of posts, *meaning one primary post and comments on the posts of two others.* It is fine to make additional brief comments that would not be counted under this category item. For example, a post not qualifying for points could be 1-2 sentences agreeing with another student's comments or thanking another student for clarification.

Topic 1: Introduction to Nutrition and Behavior & Behavioral Science

Learning Objectives
Upon completion of this week, students will be able to:
1. Understand experimental approaches to evaluating the relationship between nutrition and behavior.
2. Evaluate seminal research in the field of nutrition and behavior

Recorded Lectures:
1. Course Introduction
2. Introduction to Nutrition and Behavior
3. *Optional*: Introduction to Psychology (Dr. Goldsmith)

Readings:
1. Nutrition and Behavior: Chapters 2 and 3

2. Kalm, L. & Semba, R. (2005). They starved so that others be better fed: Remembering Ancel Keys and the Minnesota Experiment. Journal of Nutrition, 135, 1347-1352.

3. *Optional*: Gazzaniga, Heatherton, and Halpern, Ch 1 The Science of Psychology

Graded Assignments:
1. Introduce yourself! Let us know about your interests (professional, academic and personal) as well as you interest in this course. Based on this week's readings, also tell us about a concept, theory, or psychologist that you find interesting. This might be about material that is new to you, or something you already knew but are now seeing in a different light. Commenting on someone's original post is optional. This Forum is not graded but required.
Due: Thursday 9/10

Topic 2: Macronutrients
+ Overview of Cognition and Emotion

Learning Objectives

Upon completion of this week, students will be able to:

1. Understand how macronutrient intake influences cognition and emotion.
2. Understand how added sugar influences mood and behavior.
3. Evaluate the macronutrient component of popular diets for their effects on cognition and mood.

Recorded Lectures:

1. Macronutrients
2. *Optional*: Cognition and Emotion

Readings:

1. Nutrition and Behavior: Chapter 11

2. Karl et al. (2015). Transient decrements in mood during energy deficit are independent of dietary protein-to-carbohydrate ratio. Physiology and Behavior. 139: 524–531.

3. Mohorko et al. (2019). Weight loss, improved physical performance, cognitive function, eating behavior, and metabolic profile in a 12-week ketogenic diet in obese adults. Nutrition Research. 62: 64-77.

4. *Optional*: Gazzaniga, Heatherton, and Halpern, Ch 10, Emotions and Motivation

Graded Assignments:

1. Discussion Forum #1: The assigned articles evaluate the relative impact of macronutrient ratios of cognition and mood in weight maintenance and weight loss. Speculate whether one macronutrient is most influential in cognition and mood, or whether it is the ratio of the three.

Primary Post Due: Thursday 9/17
Secondary Posts Due: Sunday 9/20

Topic 3: Vitamins and Minerals
+ Overview of Learning and Memory

Learning Objectives
Upon completion of this week, students will be able to:
1. Understand the relationship between vitamins and behavior.
2. Understand the relationship between minerals and behavior.
3. Evaluate the influence of vitamins on brain and cognition in aging adults

Lecture:
1. Vitamins and Minerals
2. *Optional*: Learning and Memory

Readings:
1. Nutrition and Behavior: Chapters 7 and 8

2. Flitton et al. (2019). Vitamin intake is associated with improved visuospatial and verbal semantic memory in middle-aged individuals. Nutritional Neuroscience. 22(6): 401-408.

3. Kobe et al. (2016). Vitamin B-12 concentration, memory performance, and hippocampal structure in patients with mild cognitive impairment. American Journal of Clinical Nutrition. 103: 1045–54.

4. *Optional*: Gazzaniga, Heatherton, and Halpern, Ch 6, Learning

5. *Optional*: Gazzaniga, Heatherton, and Halpern, Ch 7, Memory

Graded Assignments:
1. Discussion Forum #2: This week's articles look at vitamin consumption and cognition in middle-aged and older adults. Based on the readings, discuss which vitamin you would recommend to your grandparents to ensure optimal cognitive aging.
Primary Post Due: Thursday 9/24
Secondary Posts Due: Sunday 9/27

Topic 4: Direct Effects of Nutrition on the Brain
+ Overview of Central Nervous System Structure and Function
Includes Residency Period

Learning Objectives
Upon completion of this week, students will be able to:
1. Understand the role of nutrients in brain development.
2. Understand the role of nutrients in adult behavior.

Recorded Lecture:
None

Readings
1. Nutrition and Behavior: Chapters 4 and 5

2. Belfort et al. (2016). Breast Milk Feeding, Brain Development, and Neurocognitive Outcomes: A 7-Year Longitudinal Study in Infants Born at Less Than 30 Weeks' Gestation. The Journal of Pediatrics. 177: 133-9.Preview the document

3. Kamino et al. (2018). Postnatal polyunsaturated fatty acids associated with larger preterm brain tissue volumes and better outcomes. Pediatric Research. 83(1): 93-101.Preview the document

4. *Optional:* Gazzaniga, Heatherton, and Halpern, Ch 3, Biology and Behavior

5. *Optional:* Gazzaniga, Heatherton, and Halpern, Ch 5, Sensation and Perception

Graded Assignments:
1. Research Presentation "Quiz": Each student will be assigned a research article by 9/21. Prepare a 5-minute talk to tell the class about the research. At least one PowerPoint slide is required, though you may use up to 5 slides. Focus - provide a thumbnail sketch of the experiment and how the work illustrates psychology concept(s). Include information from more than just the article abstract.
Powerpoint Presentations Due: Thursday 10/1.

2. Reading Discussion: Come to the residency prepared to discuss the readings (Not graded but required).

Topic 5: Functional Foods and Nutritional Supplements

Learning Objectives

Upon completion of this week, students will be able to:

1. Understand how dietary supplements influence behavior.
2. Understand how dietary supplements influence neurodegenerative diseases.

Recorded Lectures:

1. Functional Foods
2. Caffeine

Readings:

1. Nutrition and Behavior: Chapters 9 and 12

2. Buckenmeyer et al. (2015). Cognitive influence of a 5-h ENERGY® shot: Are effects perceived or real? Physiology and Behavior. 152: 323–327.

3. Hidese et al. (2019). Effects of L-Theanine Administration on Stress-Related Symptoms and Cognitive Functions in Healthy Adults: A Randomized Controlled Trial. Nutrients. 11: 2362

Graded Assignments:

1. Discussion Forum #3: Is the whole the sum of the parts? Speculate whether isolated amino acids or molecules (e.g. caffeine in 5-h energy or theanine in green tea), or the drinks themselves, influence cognition.

    Primary Post Due: Thursday 10/8
    Secondary Posts Due: Sunday 10/11

2. Final Project Topic Choice: Choose a topic in the popular press, e.g. red wine reduces Alzheimer's Disease symptoms, that links nutrition to the brain or behavior. Find one popular press article (e.g. New York Times), and one scientific article referenced in the popular press article. In 1-page (size 12 font, double-spaced), (1) summarize the articles, and (2) describe the extent to which the popular press article accurately portrays the scientific findings (e.g. does it over-simplify the results? Are there limitations to the study not reported in the popular article?).

    Due: Sunday 10/11

Topic 6: Satiety and Food Choice

Learning Objectives
Upon completion of this week, students will be able to:
1. Understand how we develop food preferences, on an individual and cultural level.
2. Understand how social support and constructs influence eating-related behaviors.

Recorded Lectures:
1. Satiety, Taste, and Food Choice

Readings:
1. Nutrition and Behavior: Chapter 10

2. Kim (2016). Food choice patterns among frail older adults: The associations between social network, food choice values, and diet quality. Appetite. 96: 116-121.

3. Suggs et al. (2018). Is it better at home with my family? The effects of people and place on children's eating behavior. Appetite. 121: 11-118.

4. Crum AJ et al. (2011) Mind over milkshakes: mindsets, not just nutrients, determine ghrelin response. Health Psychol 30: 424-9.

Graded Assignments:
1. Discussion Forum #4: In the primary post, choose one assigned article, and find a more recent article that cites that paper. Summarize the more recent article, and how it supports, refutes, or relates to the assigned article. To find articles that cite the original articles, search for the original article in scholar.google.com, and then click the "Cited by" link under the article. For instance, Hayes et al. (2011) has been cited by 25 other articles (at the time of writing the syllabus). Try to choose one that is relevant to this week's topic.

Primary Post Due: Thursday 10/15
Secondary Posts Due: Sunday 10/18

Topic 7: Eating Disorders and Obesity

Learning Objectives
Upon completion of this week, students will be able to:
1. Understand the diagnostic criteria for eating disorders.
2. Understand cognitive changes that co-occur with eating disorders.
3. Understand psychological etiology of obesity.
4. Understand psychological-based treatments for obesity.

Recorded Lectures:
1. Eating Disorders
2. Obesity

Readings:
1. DSM-5: Within Section II, go to Feeding and Eating Disorders. Read "Anorexia Nervosa", "Bulimia Nervosa", "Binge-Eating Disorder", "Other Specified Feeding or Eating Disorder"

2. Nutrition and Behavior: Chapters 14 and 15

Choose eating disorders or obesity:

3. Mallorquí-Bagué et al. (2018) Emotion Regulation as a Transdiagnostic Feature Among Eating Disorders: Cross-sectional and Longitudinal Approach. European Eating Disorders Review 26: 53-61. 3.

AND

Gardner & Brown (2014). Body size estimation in anorexia nervosa: A brief review of findings from 2003 through 2013. Psychiatry Research 219: 407-410.

OR

4. Lazarevich et al. (2016). Relationship among obesity, depression, and emotional eating in young adults. Appetite. 107: 639-644.

AND

Sutin et al. (2016). Weight discrimination and unhealthy eating-related behaviors. Appetite. 102: 83-89.

Graded Assignments:
1. Discussion Forum #5: In the primary post, think about the "chicken and the egg" conundrum as it relates to the cognitive biases in eating disorders OR emotions and obesity described in the readings. Consider whether the eating disorder behaviors and health consequences cause these cognitive biases/emotional fluctuations cause obesity, or vice versa. Incorporate at least one of the assigned readings into your post.
***Given that eating disorders may be a sensitive topic for students, please focus all comments on the scientific literature and refrain from including anecdotes from personal or professional experiences. ***
Primary Post Due: Thursday 10/22
Secondary Posts Due: Sunday 10/25

2. Final Project Literature Review: Perform a literature review of peer-reviewed articles looking at your chosen topic, which should include at least 10 peer-reviewed articles. A maximum of two review articles/meta-analyses may be included but are not required. The literature review should summarize the methods, results, primary conclusions, and limitations across the studies. The review should go into greater depth than the abstract. No portion of the literature review may be copied directly or "patchwork paraphrased" from the original sources. It should be approximately 12 pages, size 12 font, double-spaced. Provide a list of all references after the review.

Due: Thursday 10/25

Topic 8: Final Projects

Learning Objectives
Upon completion of this week, students will be able to:
1. Critically evaluate popular press articles on nutrition and behavior
2. Speak as a subject matter expert on one topic within the nutrition and behavior field

Graded Assignments:
1. Topic Choice: Choose a topic in the popular press, e.g. red wine reduces Alzheimer's Disease symptoms, that links nutrition to the brain or behavior. Find one popular press article (e.g. New York Times), and one scientific article referenced in the popular press article. In 1-page (size 12 font, double-spaced), (1) summarize the articles, and (2) describe the extent to which the popular press article accurately portrays the scientific findings (e.g. does it over-simplify the results? Are there limitations to the study not reported in the popular article?).

Due: 10/11

2. Perform a literature review of peer-reviewed articles looking at this topic, which should include at least 10 peer-reviewed articles. A maximum of two review articles/meta-analyses may be included but are not required. The literature review should summarize the methods, results, primary conclusions, and limitations across the studies. The review should go into greater depth than the abstract. No portion of the literature review may be copied directly or "patchwork paraphrased" from the original sources. It should be approximately 12 pages, size 12 font, double-spaced. Provide a list of all references after the review.

Due: 10/25

3. Choose an audience (e.g. researchers, parents, patients, etc.) who would benefit from greater knowledge into your topic. Create a pamphlet, handout, or graphic summarizing the literature.

Due: 10/29

Discussion Forum #6: In the primary post, post your final project product (i.e. a pamphlet, handout, or graphic). Summarize how the peer-reviewed articles support or do not support what you found in the popular press.

Primary Post Due: Thursday 10/29
Secondary Posts Due: Sunday 11/1