BIBC 120: Nutrition

Spring Quarter 2024

Instructor: Aaron Coleman, Ph.D.
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Office Hours: In-person on Mondays 1 – 2 pm in York Hall 3080A (my office) and York 2300 (conference room); we will move to the conference room to accommodate larger numbers. On Zoom Thursdays 10 – 11 am. The Zoom link is available on Canvas.

Course Objectives: This course will examine the anatomical, physiologic, and biochemical basis for human nutrition. We will follow how nutrients are extracted and absorbed from food via the digestive process, investigate how different nutrients are integrated into our metabolism, and examine the biochemical roles of various nutrients in maintaining health. The first overarching goal of the class will be to relate how the diet choices we make in our everyday lives affect our physiology and metabolism at the biochemical level. Part of this will be to understand the various disease states that can result from malnutrition. We will examine some of the current research being done to understand the etiology of these disease states.

The second overarching goal of the class is to provide you with the tools necessary to critically evaluate nutritional claims. We are a society bombarded with claims about the health effects of various diets and nutritional supplements from both credible and non-credible sources. Sorting out scientifically valid information from marketing and media hype requires the knowledge described above, and the ability to assess the credibility of various sources.

Course Structure	
Assignment	Point value
Nutritional Claim Assignment	150 points
Asynchronous Canvas quizzes	100 points
Midterm exam	375 points
Final exam	375 points
Total	1000 points

Lectures: Lectures will be the primary mode of content delivery for the class (there is no textbook). Lectures will be podcast, and an annotated version of the lecture slides, along with other materials, will be made available on Canvas. Lecture attendance is not mandatory but you are strongly encouraged to attend.

Required Reading: There are two research articles and one short review article that are assigned reading for the class. The research articles will not be directly discussed in lecture, although the lecture material will help you understand the articles. These articles will be represented on the exams and quizzes.

Discussion Sections: There is one remote discussion section for the class (Weds 1 – 1:50 pm) that will be held over Zoom. The primary is goal of the discussion section is to help you read and interpret the two research articles for the class. These articles are conceptually dense, and during the discussion sections you will be guided through how to approach them so you can break them down to make them more approachable. Attendance is not mandatory, but it is strongly encouraged. You will be expected to show a thorough understanding of the research articles on the exams.

Nutritional Claim Assignment: In this assignment, you will investigate the validity of a claim in the media, on the web, or from popular culture that has something to do with human nutrition. This can be a claim about the benefits of a particular diet, a nutritional supplement, or the health effects of a certain food or beverage. You will choose the claim you wish to investigate, and the only caveat is that there needs to be some information about it in the scientific literature (*i.e.*, you can find articles in PubMed). Using the template provided on Canvas, you will document the source of the claim, search popular media and literature sources to see what is being stated about the topic, and then search the scientific literature for evidence that validates or refutes the claim.

Asynchronous Canvas Quizzes: There will be semi-weekly Canvas quizzes that will help ensure you are keeping up with the material and understanding key concepts, and that will help you prepare for the exams. These will be asynchronous, auto-graded multiple-choice questions that you will complete in time windows indicated below. There will be 7 quizzes worth 20 points each, and your best 5 quizzes will be taken for your quiz point total of 100 points. Important: You are required to take all 7 quizzes. If you are ill or have internet connectivity issues that prevent you from completing a quiz, this counts as one of the 7 and is compensated for by using one of the other quizzes for your grade.

Quiz Schedule

Week	**Quiz #**	**Time Window to Complete Quiz**
2	1	Friday, April 12, 9 AM – Sunday, April 14, 5 PM
3	2	Friday, April 19, 9 AM – Sunday, April 21, 5 PM
5	3	Friday, May 3, 9 AM – Sunday, May 5, 5 PM
7	4	Friday, May 17, 9 AM – Sunday, May 19, 5 PM
8	5	Friday, May 24, 9 AM – Sunday, May 26, 5 PM
9	6	Friday, May 31, 9 AM – Sunday, June 2, 5 PM
10	7	Friday, June 7, 9 AM – Sunday, June 9, 5 PM

Exams

- **Midterm Exam (Week 6) – Saturday, May 11th, 10 am – 12 noon**
- **Final Exam – Friday, June 14th, 7 – 10 pm**

The exams will test in-depth knowledge and ability to utilize the course material in data interpretation and analysis, in addition some of the more basic aspects of nutrition. Note that the Canvas quiz questions are not representative of the exam questions. Problem sets will be provided on Canvas to help you prepare for the exams. There will be one midterm exam and the final exam, and each has a base point value of 375 points. The exam on which you do better will be weighed 50% more heavily (562.5 points), and the exam on which you do worse will be weighed 50% less (187.5 points). Make-up exams will not be given, except in case of illness that is documented by a note from a physician.

Grades: Grades will be based on the following un-curved scale. The grade cutoffs may be adjusted downward at the instructor's discretion.

905-1000	A	760-779	C+
895-904	A-	695-759	C
880-894	B+	675-694	C-
800-879	B	590-674	D
780-799	B-	0-589	F

Lecture Schedule

Week	Topics
1	Course Introduction: What are humans supposed to eat? Dietary Reference Intakes How to assess nutritional claims
Research article 1: Zhao *et al.*, 2018, Gut bacteria selectively promoted by dietary fibers alleviate type 2 diabetes, *Science* (https://www.science.org/doi/10.1126/science.aao5774) Read for midterm exam.	
2	Overview of the digestive system Digestion and absorption of carbohydrates Lactase persistence and lactose intolerance
3	Digestion of proteins and absorption of amino acids Gluten and celiac disease Is gluten bad for everyone?
4	Lipids: Fats and cholesterol Digestion and absorption of fats and cholesterol Fiber—the stuff you can't digest The gut microbiome and it's role in dietary health
5	Carbohydrate metabolism Glucose uptake and glycemic index The insulin response Added sugars: sucrose vs. high-fructose corn syrup
Additional required reading: (short review article) Svendsen *et al.*, 2017, Saturated fat—a never ending story? **Food and Nutrition Research** (doi:10.1080/16546628.2017.1377572)	
6	Lipid metabolism Lipoproteins and transport of lipids in the body Good fat-bad fat: trans fats, saturated fats, mono and poly-unsaturated fats, and cholesterol Omega-3 and omega-6 fatty acids (time permitting)
Research article 2: Jang et al., 2018, The small intestine converts dietary fructose into glucose and organic acids, *Cell Metabolism* (https://doi.org/10.1016/j.cmet.2017.12.016) Read for final exam.	
7	Amino Acid Metabolism and Dietary Protein—Guest lecture Weds, May 15 Energy balance Energy expenditure vs. calorie intake Dieting
8	The water soluble vitamins Vitamin B_{12}—vegan's dilemma Vitamin C—superhero antioxidant or just a coenzyme?
9	The fat soluble vitamins Vitamin D and calcium homeostasis Vitamin A deficiency
10	GMO foods The Golden Rice story