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[https://docs.google.com/document/d/1RzqKVLsc8OSQg4GtSfhrEDziPwNyHzfBawzN\\_9hJZU/edit?usp=sharing](https://docs.google.com/document/d/1RzqKVLsc8OSQg4GtSfhrEDziPwNyHzfBawzN_9hJZU/edit?usp=sharing)

**NUTR202**  
**PRINCIPLES OF NUTRITION SCIENCE**  
Tufts University, Friedman School of Nutrition Science and Policy  
**FALL 2022**  
(September 6 - December 22, 2022)

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**Class Meetings:**

Days/time - Tuesdays and Fridays, 1:30-3:00 pm

Location - Jaharis 156, Boston campus (on Friday Sept 30 **only** we will meet in MedEd 218). Live remote access via Zoom will be provided upon request.

Note - Bring an electronic device (smartphone, laptop, or tablet) to each class for access to Poll Everywhere, the in-class response system.\*\*

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**Instructor:**

Diane L. McKay, PhD, FACN

Email: [diane.mckay@tufts.edu](mailto:diane.mckay@tufts.edu)

Phone or text: (781) 608-7183

**Instructor Office Hours:** email, text (24/7), or in-person/online (Zoom) at a mutually convenient time.

**Teaching Assistant (TA):**

Alexis (Lexi) Endicott, RD

MS Candidate, Agriculture, Food, & the Environment

Email: [alexis.endicott@tufts.edu](mailto:alexis.endicott@tufts.edu)

**TA Office Hours:** email, or in-person/online (Zoom) at a mutually convenient time.

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**Semester Hour Units: 3.0**

**Prerequisites:** One semester of college level biology, chemistry or human physiology

**Course Description:**

This course presents the scientific principles of human nutrition. During the course of the semester students will learn the components of a healthy diet, and their health implications; understand the major nutritional problems that affect individuals and populations from conception and throughout the life cycle; and understand the scientific basis for nutritional recommendations brought before the scientific and lay communities.

**Course Objectives:**

By the end of the course, students will be able to:

1. Summarize the dietary recommendations of the major groups/organizations in the United States that recommend what to include in a healthy diet.

2. Categorize the accepted name(s) of each macronutrient (carbohydrate, protein, lipids, water) and micronutrient (vitamins and minerals); their common food sources; recommended intake; major functions and biochemical role in the body; and their mode of absorption, transport, and excretion through the body.
3. Explain the adverse health effects associated with a toxicity or deficiency of each nutrient, and any potential major public health problems.
4. Discriminate between sound and questionable nutrition information and sources.
5. Critically evaluate the quality of their own diet.

**Course Content Warning:**

This course is about learning the science behind health and well-being as it relates to nutrition and food intake. For some students the content may evoke feelings of distress. If this should occur, and it is impacting your learning experience, please contact the instructor and do what you need to take care of yourself. Tufts Counseling and Mental Health Services are available at:

<https://students.tufts.edu/health-and-wellness/counseling-and-mental-health>

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**Textbook, Software, and Materials:**

STUDENTS ARE STRONGLY ENCOURAGED TO PURCHASE THE REQUIRED TEXTBOOK AND SOFTWARE AT LEAST 2 WEEKS BEFORE THE CLASS STARTS. All versions of the required text and software are available for purchase directly from the publisher at [www.cengagebrain.com](http://www.cengagebrain.com). Do NOT purchase their MindTap product. The print version of the text is also available on other websites. To curtail costs, consider renting or sharing with a classmate.

**REQUIRED TEXT:**

**Wardlaw's Perspectives in Nutrition**-McGraw-Hill, 11th (2019) or 12th edition (2021), by Byrd-Bredbenner et al. Consider sharing a copy!

Available in hardcover (ISBN 9781259709982), looseleaf (ISBN 9781260163933) and e-text formats (ISBN 9781260501100). The 10th and 9th editions of this text are also acceptable, but nothing earlier.

When ordering a print version of the text, keep in mind that it may take some time for shipping. In the event that your textbook does not arrive by the start of class, please note the first few chapters will be made available on the Canvas course site.

**REQUIRED SOFTWARE (1 of 2):**

Diet and Wellness Plus (web-based software program from CengageBrain) will be used for analyzing your 3-day diet record. The program is available in an online version to which you will have instant access (do NOT purchase the printed card with access code).

Here is the link to purchase the [6 month instant access option for ~\\$30 \(ISBN 9781285856216\)](#) directly through Cengage. This is the best price available.

If you prefer to have access for a longer period of time, a 12-month instant access option is also available on that page for ~\$56. Earlier versions of this software are unacceptable for this course.

**IMPORTANT NOTES ABOUT DIET AND WELLNESS PLUS:**

- Please consider cost-sharing the login access for this software with your fellow students. Each copy allows up to 10 student profiles. Feel free to post your request to share on Cafe McKay, the general class discussion forum on the Canvas course site.
- You will find instructions on how to share this software on Cafe McKay, and in an Announcement posted on the Home page of the Canvas course site. If sharing, please note only one person at a time should access the software in order to prevent errors.
- You do NOT need to enter a course number or course key to use this software.
- DO NOT purchase a used version of this software unless you know when it expires.
- Students must have access to Diet and Wellness Plus in time to complete Part 1 of the Diet Record assignment, which is due at the end of Week 2.
- FOR STUDENTS TAKING THE COURSE FROM OUTSIDE OF THE U.S. visit <https://www.cengage.com/purchase-abroad> to purchase your Cengage course materials. Alternatively, you can ask another student who has already purchased this product to share. Post your request to share, or find someone willing to share on Cafe McKay, the general class discussion forum on the Canvas course site.

**\*\*REQUIRED SOFTWARE (2 of 2):**

Poll Everywhere is a classroom response system that your instructor will use to ask questions during lectures and see the class responses in real-time. It is **FREE** to Tufts students. Please follow the instructions below prior to the first class and **bring a web-enabled device to every class** so you can participate.

**Setting up your Poll Everywhere Account**

**Use your Tufts credentials to log into Poll Everywhere.**

When you go to <http://www.polleverywhere.com> click "Login" and enter your Tufts email address. You will then see a pop-up directing you to click a link to login with your Tufts credentials. After logging in you'll be taken to the Poll Everywhere site.

**Using Poll Everywhere in class**

Poll Everywhere can be accessed from any web-browser or from the Poll Everywhere mobile app (iOS and Android). For the best experience use the mobile app on your smartphone or tablet. For more information see the getting started guide:

<http://tuftsedtech.screensteps-live.com/s/19028/m/73482/l/812155-student-getting-started-gui>

**IMPORTANT NOTES ABOUT USING POLL EVERYWHERE:**

- **Always log in to Poll Everywhere before you participate.** If you do not log in your participation will not be associated with your name, and you will not get credit for any responses submitted during that session.
- In the classroom, **always connect your device to the "Tufts\_Secure" wireless network** for a fast and secure connection. For more information visit: <https://it.tufts.edu/securewireless>.
- If you run into any problems with Poll Everywhere please contact [edtech@tufts.edu](mailto:edtech@tufts.edu).

**Access to course materials on Canvas**

The online learning management system used for administering this course is Canvas. Login to [canvas.tufts.edu](https://canvas.tufts.edu) using your Tufts username and password, then click on the tile labeled, NUTR202. All course materials other than the textbook, including assignment instructions and self-assessment quizzes, are accessible on the NUTR202 Canvas site. Unless otherwise noted, all assignments must be submitted through Canvas.

**Required readings, online lectures, and supplemental materials**

Students are required to complete all required readings. Supplemental readings, although not required, are highly recommended. Lecture outlines are provided for each chapter to enhance your learning experience. You will find the lecture outlines and the learning objectives particularly helpful when preparing for the weekly quizzes. The option to watch/listen to a pre-recorded, online version of each lecture is available to students in the event that they miss a class, or if they want to review the materials at a different pace outside of class. The online lectures are closed-captioned, and written transcripts are available directly below each one.

**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 (<https://nutrition.tufts.edu/about/policies-and-procedures>) and Tufts University policies (<https://students.tufts.edu/community-standards/support-resources/academic-integrity-resources>). 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.

Students are expected to complete all assignments on their own, i.e., without assistance from other students, faculty, etc., unless otherwise noted. All outside documents used in the preparation of students' work must be properly referenced. (References to the textbook are not required).

Plagiarism will not be tolerated under any circumstance. Avoiding plagiarism is outlined in section IV of the above booklet. We use the anti-plagiarism program, [Turnitin.com](https://turnitin.com), to evaluate student work. Please contact the instructor if you have any questions about these policies.

**Communication Policy:**

All communications will be sent to your Tufts email address - please check it daily. Consider using "Cafe

McKay," the general class discussion forum on Canvas, to post questions to your instructor about course-related issues that might also be of interest to your classmates. Students should check this discussion board frequently to seek out information for themselves before contacting the instructor.

If you cannot find your answer on "Cafe McKay," or prefer privacy, feel free to contact the instructor or TA via email. If you prefer, we can also arrange a time to connect directly in-person or virtually via Zoom. Please do not wait until the last minute if your question or issue is urgent. Faculty will respond within 24 hours (please note my response time is often sooner).

**Assessment and Grading:**

Assignments for this course include required readings, in-class participation (via Poll Everywhere), weekly quizzes and digests, reflection journal entries, a 5-part dietary assessment project, and a final summation project. Instructions and grading criteria (rubric) for each assignment are provided on the Canvas course site. **Please note there are NO opportunities to earn extra credit in this course.**

Percent of overall course grade associated with each assignment:

<u>Assignment</u>	<u>Weight</u>
In-Class Responses (Poll Everywhere)	5%
Reflection Journal Entries (6)	15%
Weekly Self-Assessment Quizzes (15)	15%
Weekly Digests -"In Your Own Words" (14)	30%
Diet Record Project (Parts 1-5)	25%
Final Summation Project	10%

A passing grade in the course is B-. Course grades are assigned according to the ranges indicated below:

- A+ = 98.50 - 100
  - A = 92.50 - 98.49
  - A- = 90.00 - 92.49
  - B+ = 87.50 - 89.99
  - B = 82.50 - 87.49
  - B- = 80.00 - 82.49
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**Instructions for Submission of Assignments:**

All assignments, including in-class responses, self-assessment quizzes, written digests, reflection journal entries, diet project parts, and the final project must be submitted on their specified due date no later than 11:59PM ET (Boston time).

Assignments submitted after the posted due date/time will be assessed a 5% per day late penalty effective immediately after the deadline. To avoid a late penalty, you MUST email, text, or call the instructor and your TA at any time PRIOR to the posted due date/time to request an extension. Your extension request must include an expected date of completion. There is no limit to the number of extensions a student can

request, and we are always willing to accommodate students who may need additional time to complete their assignments - as long as they reach out at least one minute prior to the deadline.

### In-class responses

We will be using [Poll Everywhere \(PE\)](#), which is an automated classroom response system to provide an opportunity for you to address questions posed during class using a web-enabled device. (To access PE please refer to instructions above under Textbook and Software). Questions will be presented during class, and each student will be given the opportunity to respond via their own device. Students who must attend a class remotely via Zoom are also expected to respond via PE. Responses will be recorded and made available to the instructor. Your participation in these PE exercises, regardless of whether or not your answer is correct, will contribute up to 5% towards your final grade. Students must complete a minimum of 80% of all the PE questions posed throughout the semester, from **Sept 9 through Dec 9**, to receive the full 5% credit. Answering fewer than 80% of questions will result in a proportional reduction in credit. **Credit will not be given for absence due to illness or personal reasons, and students CANNOT make up missed questions.**

### Reflection journal entries

Students must complete and submit a total of six (6) reflections by the end of the semester. You may choose when you would like to compose and submit each of your reflections, but spacing them out evenly throughout the semester is highly recommended. The purpose of this assignment is to help students incorporate, retain, and apply the concepts and information they are presented with throughout this course. Your reflections do not need to be summaries, nor do they need to include all of the elements covered within a given period of time. Instead, you are encouraged to pull out specific issues/topics periodically throughout the semester that resonate with you on some level, and use them as the basis for your reflection. In each reflection we are looking for well-composed, substantive statements that are honest and demonstrate your engagement with the course materials. Each reflection should address the following three (3) items as distinct sections:

1. **Real Life Connections to Self**- Consider one of the following: How is the course material relevant to you as a consumer? How does this information relate to you and your life? How does it fit into your prior experiences and knowledge? How does this fit with what you already know and or have experienced?
2. **Real Life Connections to Others**-Pick an issue or topic that was raised in the course materials, and explain how it relates to the nutritional health of a specific group, population, or community (based on their age, sex, race, ethnicity, income, education, environment, etc.). How might you apply what you have learned in this course to address this issue and/or affect change in this group?
3. **Wonderments** - What concepts/issues related to the course materials are you trying to reconcile in your own mind? What are you still wondering about?

Please refer to the [Reflection Journal Grading Rubric](#) for details on expectations and grading. Each reflection journal entry is worth 2.5% of your course grade.

### Diet record project

Students will be asked to *a*) observe and record their own dietary habits for 3 days,\* and *b*) enter the data they have collected into the required software program, Diet and Wellness Plus, generate a 3-day average report, and *c*) provide a written assessment of their diet based on the information generated in these reports that addresses specific questions posed by the instructor. This assignment will be divided into 5 parts, due at specified intervals corresponding with the materials presented throughout the course. Part 1 is due at the end of week 2 and will require students to record their own dietary intake for

3 days, and generate a 3-day average intake report using Diet and Wellness Plus. Parts 2-5 will require students to submit their answers to specific questions related to their Part 1 report. Each individual part is worth 5% of your total grade. Please refer to the general [Grading Rubric](#) for this assignment, and to the specific grading criteria provided in the instructions for each part.

\*Accommodations can be made for students who would prefer to track and analyze someone else's diet rather than their own. Please contact the instructor or TA for details.

### Final Summation Project

At the end of the course students will be given the opportunity to demonstrate their enduring understanding of the "major nutritional problems that affect individuals and populations from conception and throughout the lifecycle" For this project, you will be asked to apply your knowledge of nutrition science to illustrate the nutrition-related issues/consequences/implications of a real world scenario on human health. A list of scenarios and range of formats to choose from will be provided.

### Weekly digests - "In Your Own Words"

Each week you will be required to write comprehensive answers to 1-3 questions that demonstrate your knowledge of and ability to apply the materials presented that week. Your answers must be composed for the target audience specified in each question, and in your own words. Please review the policies regarding plagiarism under the section labeled **Academic Conduct** above. Each individual digest is worth 1-2% of your course grade.

### Weekly self-assessment quizzes

Graded quizzes are provided to enhance your learning experience, assess your comprehension, and highlight concepts/issues of importance. Each week, students must complete a quiz based on the materials presented in the assigned readings and lectures. Quizzes are open-book, but they must be completed without any assistance from other students, instructors, TAs, etc. Once you start a quiz, you must complete it within 20 minutes. Each quiz will be open for one 7 day period only (Tuesday to Monday), and may be completed anytime within that period. Each quiz can be taken up to 2 times during that week, and the final score will be the average of the 2 attempts. **Feedback on the quiz questions will not be provided until after the due date.** That is, students will not know whether their answers were correct or incorrect until the week is over. During each of Weeks 12 and 13 on Life Cycle Nutrition (I, II, and III) and Diet, Health and Disease, students must complete 2 quizzes (one per assigned chapter/lecture). Each individual quiz is worth 1% of your course grade.

Technical issues do happen, sometimes in the middle of timed quizzes. Please know that we are aware of this, and will make every effort to work with you (and tech support) to resolve the issue. Technical issues may include your computer crashing, internet access issues, or Canvas going down. If you experience technical issues during your timed quiz, the timer will continue to run in Canvas and your work will be saved. Try to go back into Canvas and back into the quiz as soon as you can. The time will continue to count down, but Canvas will have saved your answers up to the point you lost access (Note: You do need to SAVE your answers in Canvas for them to actually be saved in case of a crash). Resume your quiz, but be sure to send an email to [canvas@tufts.edu](mailto:canvas@tufts.edu) after the quiz to document what happened and when. If you continue to have difficulty, shut down your computer, restart your browser, and log back into Canvas again. If you still have difficulty, email technical support and "cc" your instructor.

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**Technical Support:**

Online course support is provided by Friedman support staff and/or IT Support. *Please do not contact faculty or TAs for technical support.*

- **Telephone:** (617) 627-3376
- **Email:** [canvas@tufts.edu](mailto:canvas@tufts.edu)
- **Hours:** 24 hours a day, seven days a week.

When reporting a problem, please include:

- The name and number of your online course (e.g. "NUTR 202")
- Your operating system and browser
- A detailed description of the problem

This information will expedite the troubleshooting process. If you are sending a support request via email, please use your Tufts email address.

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**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.

**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. It is my intent that students from all diverse backgrounds and perspectives be well served by this course, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: race, color, ethnicity, culture, gender, age, disability, religious beliefs, political preference, sexual orientation, gender identity, socioeconomic status, citizenship, language, or national origin among other personal characteristics. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

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**Course Topics & Assignments Schedule:** This schedule is subject to modification at the instructor's discretion. (Note: "LO" refers to the course learning objectives met by each assignment).

DATE	WEEK	TOPIC	ASSIGNMENT DUE DATES
Sept 6-12	1	Nutrition Overview	<u>Week 1 (practice) quiz</u> - Sept 12 (LO 1-5) <u>Week 1 digest</u> - Sept 12



			(LO 3-5)
Sept 13-19	2	Basis of a Healthy Diet	<u>Week 2 quiz</u> - Sept 19 (LO 1-3) <u>Week 2 digest</u> - Sept 19 (LO 1,3-5) <u>Diet project, part I</u> - Sept 19 (LO 5)
Sept 20-26	3	Digestion	<u>Week 3 quiz</u> - Sept 26 (LO 1-3) <u>Week 3 digest</u> - Sept 26 (LO 2) <u>Diet project, part II</u> - Sept 26 (LO 1, 5)
Sept 27-Oct 3	4	Carbohydrates	<u>Week 4 quiz</u> - Oct 3 (LO 1-3) <u>Week 4 digest</u> - Oct 3 (LO 2,3)
Oct 4-10	5	Lipids	<u>Week 5 quiz</u> - Oct 10 (LO 1-3) <u>Week 5 digest</u> - Oct 10 (LO 2,3)
Oct 11-17	6	Proteins	<u>Week 6 quiz</u> - Oct 17 (LO 1-3) <u>Week 6 digest</u> - Oct 17 (LO 2,3) <u>Diet project, part III</u> - Oct 17 (LO 1,2,3,5)
Oct 18-24	7	Energy Metabolism/ Alcohol	<u>Week 7 quiz</u> - Oct 24 (LO 1-3) <u>Week 7 digest</u> - Oct 24 (LO 1-3)
Oct 25-31	8	Energy Balance/ Weight Management	<u>Week 8 quiz</u> - Oct 31 (LO 1-3) <u>Week 8 digest</u> - Oct 31 (LO 1,3)
Nov 1-7	9	Fat-Soluble Vitamins	<u>Week 9 quiz</u> - Nov 7 (LO 1-3) <u>Week 9 digest</u> - Nov 7

			(LO 2,3)
Nov 8-14	10	Water-Soluble Vitamins	<u>Week 10 quiz</u> - Nov 14 (LO 1-3) <u>Week 10 digest</u> - Nov 14 (LO 2,3)
Nov 15-21	11	Water/Major Minerals	<u>Week 11 quiz</u> - Nov 21 (LO 1-3) <u>Week 11 digest</u> - Nov 21 (LO 2,3)
Nov 22-28	12	Trace Minerals	<u>Week 12 quizzes (2)</u> - Nov 28 (LO 1-3) <u>Week 12 digest</u> - Nov 28 (LO 2,3) <u>Diet project, part IV</u> - Nov 28 (LO 1,2,3,5)
Nov 29-Dec 5	13	Lifecycle Nutrition, Parts I and II	<u>Week 13 quizzes (2)</u> - Dec 5 (LO 1-3) <u>Week 13 digest</u> - Dec 5 (LO 1-3)
Dec 6-12	14	Lifecycle Nutrition, Part III/ Diet & Health	<u>Week 14 quizzes (2)</u> - Dec 12 (LO 1-3) <u>Week 14 digest</u> - Dec 12 (LO 1-3) <u>Reflection Journal Entries (6)</u> - Dec 12 (LO 1-5)
Dec 13-14		Reading Period	----
Dec 15-22		Final Exam Period	<u>Diet project, part V</u> - Dec 22 (LO 1-5) <u>Final Summation Project</u> - Dec 22 (LO 1-5)

### Readings, Activities & Discussions

For the most up to date information regarding assigned readings, detailed assignment instructions, and due dates please check the **Canvas** course site. Click on the link labeled **Modules** to access the readings, online lectures, and assignments for each week.

### **IMPORTANT ASSIGNMENT NOTE: 3-Day Diet Record, Part 1 (Due end of Week 2)**

- You may begin collecting your own diet and activity data for the Diet Record Project as soon as you have access to the course site on Canvas. Instructions for Part 1, due at the end of Week 2, can be

found under the Modules link on the Canvas course site.

- Students must have access to the required software, Diet and Wellness Plus, in order to complete Part 1 of this assignment, due at the end of Week 2.
  - You may begin working on Parts 2-5 as soon as you have completed Part 1.
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## **Week 1: Nutrition Overview**

### **Learning Objectives:**

By the end of this week, students should be able to:

- Define “nutrition” and “essential nutrients.”
- Describe the six major classes of nutrients, their basic chemical structures, and respective energy values.
- Explain the role of national nutrition surveys (NHANES)
- Discuss the ABCDEFs of nutrition assessment, and the limitations of each.
- Identify the red flags of poor nutrition advice, and differentiate sources of nutrition information.

### **Required readings:**

- Wardlaw, Chapter 1 - The Science of Nutrition
- Whitney & Rolfes, Highlight 1 - Nutrition Information and Misinformation
- “How to Spot Health Fraud” (FDA)

### **Assignments:**

- Week 1 (practice) quiz
- Week 1 digest

## **Week 2: Basis of a Healthy Diet**

- Describe the components of a healthful diet, i.e., the diet planning principles (ABCDMV).
- Define nutrient density, and give examples of nutrient dense foods from each food group.
- Explain the four sets of dietary standards of the DRIs, how they are determined, and how/when each is applied.
- Compare DVs with DRIs, and explain how DVs are used on Nutrition Facts Panels.
- Interpret the nutrition information provided on food packaging labels.
- Distinguish between the three types of claims allowed on food labels and the conditions under which each is allowed.
- Summarize the purpose of the Dietary Guidelines for Americans (DGA).
- Describe the components of the current USDA Food Guide Graphic, and how this graphic relates to the DGA.

### **Required readings:**

- Wardlaw, Chapter 2 - Tools of a Healthy Diet
- Whitney & Rolfes, Chapter 2 (pg 38-40 only)
- Critical Health Applications of the DRIs (NAM)
- Guidance on How to Understand and Use the Nutritional Facts Panel on Food Labels (FDA)

- 2020-2025 Dietary Guidelines for Americans - Executive Summary (USDA/DHHS)
- Current USDA Food Guide Graphic - MyPlate.gov > Eat Healthy (USDA)
- Culturally Appropriate Food Guides (Oldways Preservation Trust)
- Should the Dietary Guidelines Fight Systemic Racism? (Civil Eats, 2020)
- “Is American Dietetics a White Bread World?” (NY Times, 2020)
- “Our Idea of Healthy Eating Excludes Other Cultures and That’s a Problem” (SELF, 2018)
- Using What’s at Hand (serving size guide, Healthwise)

**Assignments:**

- Week 2 quiz
- Week 2 digest
- Diet project, part I

**Week 3: Digestion and Absorption**

**Learning Objectives:**

By the end of this week, students should be able to:

- Outline the overall physiological processes of digestion and absorption, including the roles played by each organ within the gastrointestinal tract (mouth, stomach, small intestine, large intestine) and the accessory organs (salivary glands, liver, gallbladder, and pancreas).
- Identify the major enzyme classes and hormones that act in the digestion of the various nutrients, and indicate how they work.
- Compare the general differences between fat- vs. water-soluble nutrients during digestion, absorption, and transport, and outline each step in the process.
- Describe, in detail, the digestion of a meal containing all 3 macronutrients, i.e., carbohydrates, lipids, and protein.
- Summarize the major nutrition-related gastrointestinal health problems
- Discuss the relationship between gut microbes, prebiotics, and probiotics

**Required readings:**

- Wardlaw, Chapter 4 - Digestion & Absorption
- Transport of Nutrients (handout)
- Probiotics Come With Bold Health Claims, but the Science is Shaky (STAT, 2016)

**Assignments:**

- Week 3 quiz
- Week 3 digest
- Diet project, part II

**Week 4: Carbohydrates**

**Learning Objectives:**

By the end of this week, students should be able to:

- Differentiate between mono-, di-, oligo-, and polysaccharides and identify food sources of each.
- Summarize the digestion and absorption of the different types of carbohydrates.
- Describe the major functions of simple and complex carbohydrates in the body and their

health effects.

- Discuss the role of dietary fiber in disease prevention, and the potential mechanisms involved.
- Explain the roles of the hormones insulin and glucagon in the regulation of blood glucose, i.e, glucose homeostasis.

**Required readings:**

- Wardlaw, Chapter 5 - Carbohydrates
- "The Nutrition Source: Fiber"(Harvard School of Public Health)
- "Types of Fiber and their Health Benefits" (WebMD)

**Assignments:**

- Week 4 quiz
- Week 4 digest

**Week 5: Lipids**

**Learning Objectives:**

By the end of this week, students should be able to:

- Describe the structure, biological significance, and sources of each category of lipids, i.e, triglycerides, phospholipids, and sterols.
- Explain the differences between saturated, monounsaturated, and polyunsaturated fatty acids with regard to their respective chemical structures, predominant food sources, and health effects.
- Identify the two essential omega-3 and omega-6 fatty acids and summarize their respective health effects.
- Discuss the origins and food sources of trans fatty acids and their effect on health
- Summarize the digestion and absorption of dietary fat, including the role of bile.
- Explain the structure and role of each type of lipoprotein (i.e, chylomicrons, VLDL, LDL, and HDL) in lipid transport throughout the body.
- Describe the major functions of fat in the body.

**Required readings:**

- Wardlaw, Chapter 6 - Lipids
- "The Nutrition Source: Types of Fat" (Harvard School of Public Health)
- Omega-3 Fatty Acids Fact Sheet for Health Professionals (NIH ODS)
- Eat Smart: Fats (AHA)

**Assignments:**

- Week 5 quiz
- Week 5 digest

**Week 6: Proteins**

**Learning Objectives:**

By the end of this week, students should be able to:

- Identify the structure of amino acids and describe how they form proteins in the body.

- Define essential and nonessential amino acids and the role of deamination and transamination in protein synthesis and metabolism.
- Compare complete (high-quality) and incomplete (low-quality) proteins and their respective food sources.
- Explain the concept of a limiting amino acid and how it relates to protein quality.
- Summarize the digestion and absorption of protein.
- Describe the major physiological functions of protein and their effects on health.

**Required readings:**

- Wardlaw, Chapter 7 - Protein
- "The Myth of the Indian Vegetarian Nation" (BBC, 2016)
- World Meat and Dairy Production (Our World in Data)

**Assignments:**

- Week 6 quiz
- Week 6 digest
- Diet project, part III

**Week 7: Energy Metabolism; Alcohol**

**Learning Objectives:**

By the end of this week, students should be able to:

- Define *anabolic* and *catabolic reactions*, and give an example of each
- Define ATP and describe its 3 major functions in the body i.e., types of work for which it is required.
- Besides ATP, list the other 2 compounds produced in cells after food is completely metabolized.
- Identify the three (3) major metabolic pathways through which the macronutrients are converted into energy, and where energy metabolism occurs in the cell.
- Examine the general differences between the metabolism of carbohydrates, fats, and proteins into usable energy (ATP).
- Define *ketosis* and describe the conditions in which it occurs.
- Outline the metabolic consequences of consuming an excessive amount of any macronutrient (in excess of the body's energy/calorie needs)
- Compare the fate of each macronutrient in the body during feasting (consuming any macronutrient in excess of the body's energy/calorie needs), fasting (after nutrients from a meal are no longer available for energy) and prolonged fasting (after glycogen is depleted).
- Define the term "*one drink*" when referring to an alcoholic beverage
- Define the term "*moderate alcohol consumption*" for both men and women
- Briefly describe the process of alcohol absorption and metabolism, including the role of the enzyme alcohol dehydrogenase and the microsomal ethanol oxidizing system (MEOS).
- List the potential health benefits associated with moderate alcohol consumption
- List the nutrients that are most likely to be deficient in a diet of a person who abuses alcohol.
- Define *Wernicke-Korsakoff Syndrome*
- Summarize the negative health effects of alcohol abuse, i.e., how alcohol damages body

organs, such as the liver, heart, and brain.

- Define *fatty liver disease, cirrhosis*
- Describe the impact of alcohol consumption during pregnancy.

**Required readings:**

- Wardlaw, Chapter 8 - Alcohol
- Wardlaw, Chapter 9 - Energy Metabolism
- Energy Metabolism Overview (handout)
- Binge drinking dangerous for young adults (ScienceDaily, 2016)
- Bone mass suffers with binge drinking (ScienceDaily, 2018)

**Assignments:**

- Week 7 quiz
- Week 7 digest

**Week 8 Lecture: Energy Balance and Weight Control**

**Lecture Learning Objectives:**

By the end of this lecture, students should be able to:

- Define energy balance, and discuss how changes in energy balance affect body weight
- Describe the major components of "energy in" vs. "energy out"
- Define & state the relative contributions of the 3 major components of energy expenditure (basal metabolism, physical activity, thermic effect of food)
- List several factors that can affect BMR.
- List the variables required to calculate your estimated energy requirements or EER.
- Define BMI, describe its limitations, and summarize how BMI is used to define underweight, healthy weight, overweight, and obesity in public health settings.
- Describe the common methods used to assess body composition, i.e., proportion of fat mass to lean mass (muscle), and their limitations.
- Explain the health risks of too little and too much body fat, with an emphasis on central obesity and its associated health risks.
- Discuss the prevalence of overweight and obesity among adults in the U.S..
- Describe how fat cells develop, and the role of lipoprotein lipase (LPL) in fat storage.
- Discuss how genetics, environment, and the regulation of hunger and satiety contribute to the development of overweight and obesity.
- List the health risks associated with fad diets, weight loss products, prescription drugs and surgical interventions in treating obesity.
- Discuss the role of diet, physical activity, and behavior change as keys to managing body weight.
- Summarize the characteristics of a sound eating plan for weight management.

**Required readings:**

- Wardlaw, Chapter 10 - Energy Balance, Weight Control, and Eating Disorders (skip the section on Eating Disorders)
- Widespread Misconceptions About Obesity (Can Fam Physician, 2014)
- "Racism and Obesity are Inextricably Linked" (Boston.com, 2021)
- U.S. Obesity Trends Map by Race/Ethnicity, State and Territory (CDC)

- Promoting Ethnic Parity in Health, Leaving Behind "Race": A Challenge for the Global Community (Am J Clin Nutr editorial, 2020)
- BMI and Mortality - Time to Revisit Current Recommendations for Risk Assessment (Am J Clin Nutr editorial, 2020)
- Dietary Supplements for Weight Loss Fact Sheet for Health Professionals (NIH ODS)

**Assignments:**

- Week 8 quiz
- Week 8 digest

**Week 9: Fat-Soluble Vitamins**

**Learning Objectives:**

By the end of this week, students should be able to:

- Summarize the general differences between macronutrients (carbohydrates, lipids, proteins) and micronutrients (vitamins and minerals)
- List the fat-soluble and water-soluble vitamins and describe, in general, how their solubility affects their absorption, transport, storage, and excretion.
- List the common and chemical names for each fat-soluble vitamin and their primary food sources
- Outline the major functions or role of each fat-soluble vitamin in the body.
- Describe the common deficiency symptoms for each fat-soluble vitamin and the conditions in which deficiencies are likely to occur
- Describe the toxicity symptoms caused by the consumption of each fat-soluble vitamin in excess of their tolerable upper intake level (UL)
- Consider the reasons for why certain population groups might be at risk for fat-soluble vitamin deficiencies
- Illustrate the role of vitamin A in vision.
- Diagram the process by which active vitamin D is produced in the body via sunlight exposure and its limitations
- List the antioxidant vitamins and the major cell components they protect against oxidative stress

**Required readings:**

- Wardlaw, Chapter 12 - Fat-Soluble Vitamins
- Vitamin D Fact Sheet for Health Professionals (NIH ODS)
- The Vitamin D-lemma (Nature, 2011)

**Assignments:**

- Activity (optional)- Fat-Soluble Vitamins Chart
- Week 9 quiz
- Week 9 digest

**Week 10: Water-Soluble Vitamins**

**Learning Objectives:**

By the end of this week, students should be able to:



- List the common and chemical names for each water-soluble vitamin and their primary food sources
- Outline the major functions or role of each water-soluble vitamin in the body.
- Describe the common deficiency symptoms for each water-soluble vitamin and the conditions in which deficiencies are likely to occur
- Describe the toxicity symptoms caused by the excess consumption of each water-soluble for which a UL has been established
- Consider the reasons for why some population groups might be at risk for certain water-soluble vitamin deficiencies
- Outline the process by which vitamin B12 from food sources is digested and absorbed.
- Compare the different types of vitamin-related anemias and how they develop.

**Required readings:**

- Wardlaw, Chapter 13 - Water-Soluble Vitamins

**Assignments:**

- Activity (optional)- Water-Soluble Vitamins Chart
- Week 10 quiz
- Week 10 digest

**Week 11: Major Minerals and Water**

**Learning Objectives:**

By the end of this week, students should be able to:

- Summarize the key functions of water in the body.
- Explain the components of water balance (water “in” vs. water “out”) and why it is considered an essential nutrient
- Discuss the daily water recommendations for humans and how they relate to water balance.
- Summarize the general similarities and differences between vitamins and minerals.
- Describe the general differences between major, trace, and ultra-trace minerals with regard to human health.
- List the factors that affect mineral bioavailability in general.
- List the primary food sources for each major mineral
- Outline the major functions or role of each major mineral in the body for which an AI or RDA has been established.
- Describe the common deficiency symptoms associated with each major mineral and the conditions in which deficiencies are likely to occur.
- Describe the toxicity symptoms caused by the excess consumption of each major mineral for which a UL has been established
- Consider the reasons for why some population groups might be at risk for certain major mineral deficiencies
- Diagram the process by which calcium homeostasis is maintained in the human body, and list the major hormones and organs involved.
- Identify the risk factors for the development of *osteoporosis* and describe the role of physical activity and dietary factors in preventing this disease.

- Define “*electrolyte*,” list the major electrolyte minerals, and describe their common functions
- Compare the effects of sodium and potassium on blood pressure, and discuss the role of diet in the development and treatment of hypertension.

**Required readings:**

- Wardlaw, Chapter 14 - Water & Major Minerals
- Racial/Ethnic and Socioeconomic Disparities in Hydration Status Among U.S. Adults and the Role of Tap Water and Other Beverage Intake (Am J Public Health, 2017)
- Salt Reference Intake Levels Updated (MedPage Today, 2019)
- Calcium Fact Sheet for Health Professionals (NIH ODS)

**Assignments:**

- Activity (optional)- Major Minerals Chart
- Week 11 quiz
- Week 11 digest

**Week 12: Trace Minerals**

**Learning Objectives:**

By the end of this lecture, students should be able to:

- List the primary food sources for each trace mineral
- Outline the major functions or role of each trace mineral in the body.
- Describe the common deficiency symptoms associated with each trace mineral and the conditions in which deficiencies are likely to occur.
- Describe the toxicity symptoms caused by the excess consumption of each trace mineral for which a UL has been established.
- Consider the reasons for why some population groups might be at risk for certain major mineral deficiencies
- Describe, in general, the absorption, transport, storage, and excretion of iron and zinc, with an emphasis on the role of the mucosal block.
- Compare the availability of iron from plant vs. animal food sources and the potential health implications of different dietary preferences.
- Identify and describe the potential health consequences of trace mineral interactions (e.g., iron, zinc, copper) in humans.

**Required readings:**

- Wardlaw, Chapter 15 - Trace Minerals
- Multivitamin/mineral Supplements Fact Sheet for Health Professionals (NIH ODS)

**Assignments:**

- Activity (optional)- Trace Minerals Chart
- Week 12 quiz
- Week 12 digest
- Diet project, part IV

**Week 13: Lifecycle Nutrition I and II**

### **Learning Objectives:**

By the end of this week, students should be able to:

- Explain why a nutritionally adequate diet is important long before a pregnancy is established.
- Discuss the role of folate/folic acid during the early stages of fetal development, and the rationale for folic acid fortification programs.
- Define the terms “critical period,” “neural tube defect (NTD),” and “spina bifida.”
- Summarize the increased nutrient needs of the mother during pregnancy, including total calories, and the micronutrients required for blood production, cell growth, and bone development, and their impact on the mother and fetus.
- Describe the relationship between maternal weight gain during pregnancy and infant birthweight, and the health implications for both mother and infant.
- Discuss the specific nutrient needs of the mother during lactation, including additional calories and fluids, and list the habits that are incompatible with lactation.
- Outline the benefits of breastfeeding for both the infant and mother
  
- Compare the energy (calorie), water, macronutrient, and micronutrient needs of infants, children, and adolescents, and how they relate to the physiological changes that occur with each stage of development.
- Describe how the growth and nutritional status of infants and children is assessed, and how this information is applied.
- Discuss the recommendations for feeding an infant during the first year, and how breast milk, infant formula, and the introduction of solid foods affect their nutritional health.
- Describe the nutritional problems that may occur during the growing years (obesity in particular) and their potential impact on future health.

### **Required readings:**

- Wardlaw, Chapter 16 - Nutritional Aspects of Pregnancy & Breastfeeding
- Wardlaw, Chapter 17 - Nutritional During the Growing Years
- Prenatal Foundations: Fetal Programming of Health and Development (Zero to Three, 2014)
- Factors Influencing Children's Eating Behaviours, Fig 1 & Table 1 (Nutrients, 2018)
- Maternal, Infant, and Child Health - Overview (HealthyPeople.gov)

### **Assignments:**

- Week 13, chapter 16 quiz
- Week 13, chapter 17 quiz
- Week 13 digest

## **Week 14: Lifecycle Nutrition III and Diet, Health, & Disease**

### **Learning Objectives:**

By the end of this week, students should be able to:

- Discuss the physiological changes that occur throughout the aging process and the nutritional implications of these changes.
- Summarize the nutrients of concern for aging adults and identify the reasons why they are

- of concern in this particular population.
- Outline food-related factors that can predict malnutrition in older adults.
  - Categorize the important lifestyle factors (modifiable and non-modifiable) that promote health and disease throughout the adult years
  - Describe the development of, risk factors for, and nutrition recommendations specific to each of the major diet-related chronic diseases discussed (cardiovascular disease, hypertension, type 2 diabetes, and cancer).
  - Summarize the potential impact of adhering to the recommendations outlined by the *Dietary Guidelines for Americans* and its related food guide graphic, *MyPlate*, on diet-related chronic disease risk in adults.

**Required readings:**

- Wardlaw, Chapter 18 - Nutrition During the Adult Years
- Whitney & Rolfes, Chapter 18 - Disease Prevention
- Tufts University's MyPlate for Older Adults
- The State of Senior Hunger in America (Feeding America, 2020)
- Addressing Health Disparities Among Minority Populations (JAMA Neurology, 2020)

**Assignments:**

- Week 14, chapter 18 (Wardlaw) quiz
- Week 14, chapter 18 (Whitney & Rolfes) quiz
- Week 14 digest

**Week 15: Final Week**

**Assignments:**

- Diet project, part V
- Final summation project