

September 12, 2020

**Tufts University, Friedman School of Nutrition Science and Policy**

**NUTB 205 NUTRITIONAL BIOCHEMISTRY WITH COMMUNITY/CLINICAL APPLICATIONS: MACRONUTRIENTS (BIOCHEMISTRY I)**

*August 1, 2020– December 19, 2020*

**Class Meetings:** Not relevant. This is a blended class.

<b>Instructors and TA</b>	<b>Email</b>
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**Graduate Credits:** 3.0 SHUs

**Prerequisites:** Standard introductory general chemistry, organic chemistry, biochemistry, physiology, and nutrition courses

**Course Description**

Students will explore the fundamental roles of nutrients in biological systems and the implications of nutrient biological functions on controversies in the field. Particular emphasis will be placed on the function of nutrients as defined by their chemistry, interrelations among nutrient functions, mechanistic approaches in the analysis of nutrient-disease relationships, and recent advances in the basic sciences related to nutrition and nutrient function. The course will integrate examples of community, clinical and public health policy applications throughout the term. Published journal articles from the peer reviewed literature, case histories, and public policy documents will form the basis for critical review and discussion. This course is the first course of a two-course sequence (NUTB 205 and NUTB 305).

**Course Objectives/Outcomes**

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

- describe and explain the following fundamentals for protein, carbohydrate, fat, and fiber in a biological system including:
  - scientific and common name
  - digestion, absorption, transport, metabolism
  - biochemical role
  - diet sources
  - methods by which nutritional status is assessed and DRIs established.
  - deficiency and toxicity symptoms and their prevalences in the general population.
- use this knowledge to comprehend and critique published journal articles that represent both seminal and recent state of our knowledge for each nutrient.
- explain the role of nutrition components in causing or alleviating major chronic diseases.
- discuss the results of nutrition intervention trials to prevent/cure the disease and critique the successes and failures of each of these trials.

**Texts or Materials:** *Advanced Nutrition and Human Metabolism*, Sixth Edition. Sareen S. Gropper and Jack L. Smith, editors. Wadsworth: Cengage Learning, Belmont CA, ISBN-13:978-1-133-10405-6.

### **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](http://uss.tufts.edu/studentaffairs/judicialaffairs/Academic%20Integrity.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.

### **Classroom Conduct and 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. As a member of a cohort in an intensive experiential learning community, 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 your and your colleague's learning experiences.

Therefore, please arrange to be present at all residency sessions; due to COVID, the residency sessions will be offered in real-time via Zoom. . 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, from your peers, as well as on the "Question Board" in the class site. If you do not find your answer contact the instructor as soon as possible. Please do not wait. Faculty 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.

### **Assessment and Grading**

The following guidelines are used in evaluating course performance:

1. Class assignments will be evaluated on the basis of completeness, originality, scientific soundness and relevance to the assigned topic, as well as participation as deemed appropriate by the course instructors.
2. Written work 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.
4. Attendance at all 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. On-line discussions will be evaluated according to the matrix on the next page. The rubric for discussions has 7 points. **Each day a discussion is overdue will cost 1 point. Discussions are generally due on Sunday evenings. They will be closed to posting on Wednesday evenings.**

### Simple Rubric for Online Discussions

<b>Discussion Assignments Grading Criteria</b>			
	<b>0 Does not meet requirements</b>	<b>1 Meets Requirements</b>	<b>2 Exceeds Requirements</b>
<b>Quality of posting</b>	Postings are not relevant to the questions posed, or too simplistic/not thorough, or no posting at all.	Postings reflect the reading and some outside source material but outside source material not cited.	Postings reflect the readings and outside information with proper outside source material informal citation.
<b>Quality of reply</b>	Response not relevant to original posting, or no reply at all.	Response relevant to posting but fails to support position.	Response relevant to posting and supports position with factual information.
<b>Understanding of reading and outside source material</b>	Responds to the question posted but does not mention materials from the readings.	Responds to the question posted and makes reference to readings.	Responds to question posted and demonstrates understanding of material and outside source material and properly cites information.
<b>Timeliness of Posting</b>	Posting or response was not completed on time.	Posting and response were completed on time.	

<b>Item</b>	<b>Percent of grade</b>
Three timed, essay-style midterm exams (15% each)	45
One take-home final exam	20
Online discussion for Weeks 1,2,3,6,7,8,9,10,11,12,13) (see grading matrix below)	22
Residency attendance and all class preparedness	6
Residency group presentation	7

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. Grades less than B- 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.

### Course Prerequisites

One course each in introductory nutrition, biochemistry, and physiology, all at the undergraduate level. All three must be completed satisfactorily before enrolling in NUTB 205.

### **Course Requirements**

1. Attend all residency sessions (arrive on time and remain for the entire scheduled session).
2. Contribute with positive participation and involvement in all in-class and on-line activities.
3. Complete all in-class and group assignments.
4. Contribute constructively to all on-line discussions.
5. Complete all exams

### **Readings, Activities & Discussions**

Specific information and directions on required text/book/pdf reading, assignments, and discussions for each week of the course are in the Weekly Overview of the class on Canvas.

### **Technical Support**

All technical support questions should be directed to [canvas@tufts.edu](mailto:canvas@tufts.edu). Students should contact technical support for technical issues. Monday through Friday 9 am - 5pm (Eastern Time). Faculty should not be contacted for technical support.

### **Assignments and Submission Instructions**

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 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.

### **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 person and academic potential. If you have a disability that required reasonable accommodations please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to make arrangements of determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeline4ss a critical aspect for their provision.

## CLASS SCHEDULE

Date	Time	Week	Topic	Instructor	Guest Lecturer
<b>Review Material To Cover On your Own</b>					
< Sept 8	Before topic area begins		Chapters 1, 2 (Review) Read chapters 3 – 6 throughout the semester.		
< Sept 8	Before Week 1	Online lecture	Structure, Classification and Food Sources; Carbohydrate Digestion and Absorption	Saltzman	
<Sept. 8	Before Week 3	Online lecture	Lipids - Structures, Digestion, and Absorption	Lichtenstein	
<Sept 8	Before residency	Online lecture	Protein: Basic concepts; Protein - Food Sources, Nitrogen Cycle, Digestion and Absorption, Intestinal Cell Metabolism, and Amino Acid Catabolism	Ausman	
<b>Course Begins</b>					
Sept. 8 - 13		Week 1	Lipid Transport and Lipoprotein Metabolism; Lipid Metabolism	Lichtenstein	
Sept 14 - 20		Week 2	Carbohydrate Transport and Metabolism; Carbohydrate Controversies	Ausman	Ip
Sept. 21 - 27		Week 3	Fiber	Ausman	Saltzman
All residency classes will use Zoom and will be synchronous.					
<b>Residency Sept. 29 – Oct 2</b>					
Sept 29 (TUES) (9 - 10:30 am)	1.5 hours	(Equivalent of Weeks 4-5 in a semester)	Diet, Lifestyle and Cardiovascular Disease Lecture	Lichtenstein	
Sept 29 (TUES)	1.5 hours		Protein Requirements and Protein Quality Lecture	Ausman	

(10:45 am – 12:15 pm)					
Sept 30 (WED) (9:00-10:30 am)	1.5 hours		Metabolic Syndrome and Dietary Patterns	Lichtenstein	
Sept 30 (WED) (10:45 am – 12:15 pm)	1.5 hours		In class discussion on current controversies.	Lichtenstein	
Oct 1 (THURS) (9 am – 10:30 am)	1.5 hours		Working time for students for presentations	Ausman	
Oct 1 (THURS) (10:45 am – 12:15 pm)	1.5 hours		Energy Expenditure and Body Composition Lecture	Das	
Oct 2 (FRI) (9:00 -10:30 am)	1.5 hours		Carbohydrate and Lipid Student Presentations	Ausman and Das	
Oct 2 (FRI) (10:30 am– 12:15 pm)	1.5 hours		Protein Student Presentations	Ausman, Das	
<b>Oct 8 - 11</b>			Timed Exam from Home Exam #1 Weeks 1-3		
<b>Oct 12 - 18</b>		Week 6	Microbiome	Ausman	Karl
<b>Oct 19 – 25</b>		Week 7	Hormonal and Dietary Regulation of Intake	Das	
<b>Oct 25 -27</b>			Proctored Exam #2 Weeks 4-6		
<b>Oct 26 –Nov. 1</b>		Week 8	Undernutrition and Overnutrition	Das	
<b>Nov 2 - 8</b>		Week 9	Insulin Resistance, Obesity, and Diabetes	Kaushik	

<b>Nov 9 – 15</b>		Week 10	Protein: Metabolism of Amino Acids in Liver, Brain, Muscle, and Kidney	Ausman	
<b>Nov 15 - 17</b>			Timed Exam #3 over Weeks 7, 8 and 9		
<b>Nov 16 – 22</b>		Week 11	Protein: Metabolism of Sulfur Amino Acids Methionine, Cysteine, and Taurine	Ausman	
<b>Thanksgiving Week Break</b>					
<b>Nov 30 – Dec 6</b>		Week 12	Protein: Synthesis, Degradation and Loss of Lean Muscle Mass	Ausman	
<b>Dec 7 - 11</b>		Week 13	Protein Energy Malnutrition; and kwashiorkor Protein: Lysine, Threonine, and Arginine Metabolism	Ausman	
<b>Dec 12 - 14</b>			Study Period		
<b>Dec 15 - 22</b>			Take Home Exam #4 over Weeks 10, 11, 12, and 13		