

NUTR 371
Nutritional Biochemistry and Physiology: Micronutrients
Spring 2016

Meets:

Mondays 9:30-11:45 am and Wednesdays 13:30-3:45 pm

Course Director:

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Instructors:

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Office hours by appointment

Tufts Graduate Credit:

1.5 credits

Prerequisites:

Graduate biochemistry and NUTR 201 or 202 or equivalents, or by instructor permission.

Course Description:

NUTR 371 is an advanced course in the biochemistry and physiology of micronutrients. Students are expected to be familiar with the material covered in an introductory nutrition course as well as graduate biochemistry, and have a basic familiarity with physiology. NUTR 371 covers fat soluble nutrients, water soluble nutrients, and minerals. Topics that will be covered include nutrient bioavailability, transport, function at biochemical and physiological levels, measurements of nutrients and nutrient status, and current controversies. Lectures will be provided in face-to-face format. In-class activities in addition to lectures will include team based learning (TBL) and each student will provide both brief and more detailed presentations or discussions.

Course Objectives:

By successful completion of this course, for each of the micronutrients covered, students should be able to:

- Explain mechanisms of digestion and absorption.
- Discuss factors influencing bioavailability and provide examples.
- Describe biochemical and physiological functions of the nutrient and illustrate roles of nutrients in these functions.
- Explain mechanisms of nutrient homeostasis in the body.

- Discuss methods to assess nutrient status and the strengths and weaknesses of these methods.
- Describe manifestations of deficiency and toxicity states and relate biochemical and physiological roles of nutrients to these manifestations.
- Identify scientific gaps in knowledge and controversies, and propose approaches to resolve these gaps or controversies.

Course Texts and Materials:

Lists of required and optional reading will be posted on Trunk under each lecture topic. Several topics will utilize the online textbook Modern Nutrition in Health and Disease (2014), which is available through the Tufts University Health Sciences webpage. Other reading will be posted to Trunk.

Accommodations 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.

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://www.nutrition.tufts.edu/student/documents/policies-procedures>) 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:

Students should treat each other and faculty with respect. Class will begin and end on time and students should arrive for class on time. Preparation for class, including completion of assigned reading, is necessary to fully participate in class activities. Attendance in class for lectures is optional but highly recommended. Attendance in class is expected for TBL and on days when there are student presentations.

Description of course elements:

- Lectures: Lectures will be provided in the classroom and may also be provided online. Links to the online lecture slides and recordings will be posted on Trunk. Online lectures should be completed by the due date in the syllabus. Attendance in lectures is not required, but participation in class contributes to the course grade.
- Readings: Required and supplemental readings will be posted on Trunk. It is expected that required readings that accompany a lecture will be completed in advance of that lecture so that content can be discussed in class. A portion of the class participation contribution to the final grade is based on this preparedness.
- Exams: There will be three 2-hour in class exams during the course. The initial two exams will cover only the specific section of the class that precedes the exam. The final exam will be cumulative. The format of exams will be short answer, matching and multiple choice. Material covered in all course activities may contribute to exams.
- Five written assignments: Five brief written assignments to be completed and submitted in writing to Trunk within one week of assignment.
- "Elevator speeches" and accompanying abstracts: Each student will be required to prepare and

present to the class two “elevator speeches”, each of which should not last more than two minutes. For each of these a one page abstract will be prepared that corresponds to the content of the speech. One speech/abstract will be focused on a proposal to resolve a gap in knowledge or conflict regarding a nutrient and delivery should be focused on a scientific audience. The other speech/abstract will be focused on distilling and delivering information about a micronutrient to the general public. Topics will be derived from the material covered in class but students are expected to expand upon the topic beyond what was covered in class. A schedule for presentations will be determined during the first week of class. Abstracts must be submitted on the day the speech is given.

- Team based learning: Students will work together in class for this activity. Reading will be assigned and must be completed in advance. Once in class, students will take a brief quiz to assess understanding of the readings; the quiz will not be graded or contribute to credit for the activity. Students will then be divided into small groups and questions for discussion will be assigned. The class will then reconvene as a whole for discussion of the assigned questions, with each small group reporting. Specific instructions will be provided in class.
- Discussions or debates. Students will be assigned to discuss or debate controversial issues. Advance preparation outside of class will be required.

Instructions for submission of assignments and exams:

Assignments should be submitted via Trunk. If Trunk is not operational, the assignment should be emailed to both the course instructor and TA prior to the time the assignment is due.

Students who are unable to complete an assignment or exam on time and are requesting an extension should notify the course director and/or TA in person, by email or by phone *prior to the assignment deadline* with a brief explanation for why the extension is needed.

Assignments received after deadlines subject to an automatic 1% reduction in credit per day (e.g. for a written assignment worth 4% of total course credit, assignments submitted 0-24 hours late will be subject to automatic reduction of 1% to a maximum credit value of 3%, and if submitted > 24-48 hours late will be subject to automatic reduction of 2% to a maximum of 2% of course credit.

Assignments and Grading:

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

3 in-class exams (equally weighted)	60%
Weekly assignments (equally weighted)	20%
Elevator speeches/abstracts	6%
TBL/debates/discussions	9%
Regular class preparedness	5%

A passing grade in the course is B- or better. Course grades will be based on the below (subject to revision during the course):

A	> 94%
A-	90 - <94%
B+	87 - <90%
B	84 - <87%
B-	80 - <84%

Learning objectives and reading assignments:

Objectives for each lecture and assigned reading will be posted on Trunk.

Course & Assignment Schedule					
Class #	Date	Time	Topic (Faculty)	Faculty	Assignments
1	Mon Jan 25	9:30-11:45 AM	Iron	Saltzman	Weekly assignment 1 released
2	Weds Jan 27	1:30-3:45 PM	Vitamin D	Booth	
3	Mon Feb 1	9:30-11:45 AM	Vitamin K	Booth	Weekly assignment 1 due
4	Weds Feb 3	1:30-3:45 PM	Calcium and Phosphorus	Saltzman	Weekly assignment 2 released
5	Mon Feb 8	9:30-11:45 AM	Chromium, Iodine, Magnesium	Saltzman	
6	Weds Feb 10	1:30-3:45 PM	Zinc and Copper	Saltzman	Weekly assignment 2 due
	Mon Feb 15	9:30-11:45 AM	President's Day – No Class		
7	Weds Feb 17	1:30-3:45 PM	Review	LaJoie	
8	Thurs Feb 18	9:30-11:45 AM	Exam 1	LaJoie	
9	Mon Feb 22	9:30-11:45 AM	Oxidative Stress	Chen	
10	Weds Feb 24	1:30-3:45 PM	Vitamin E	Wu	
11	Mon Feb 29	9:30-11:45 AM	Vitamin E	Wu	
12	Weds Mar 2	1:30-3:45 PM	Vitamin C	Saltzman	Weekly assignment 3 released
13	Mon Mar 7	9:30-11:45 AM	Selenium	Chen	
14	Weds Mar 9	1:30-3:45 PM	Review	LaJoie	
15	Mon Mar 14	9:30-11:45 AM	Exam 2		Weekly assignment 3 due
16	Weds Mar 16		TBL or Debate/Discussion: Sodium and Blood Pressure	LaJoie	
	Mar 21 and Mar 23		Spring Break – No Class		
17	Mon Mar 28	9:30-11:45 AM	Niacin, Aging and Sirtuins	Kaushik	Weekly assignment 4 released
18	Weds Mar 30	1:30-3:45 PM	Vitamin B ₆ and Riboflavin		
19	Mon Apr 4	9:30-11:45 AM	Biotin and Pantothenic Acid	LaJoie	Weekly assignment 4 due
20	Weds Apr 6	1:30-3:45 PM	Vitamin B ₁₂ and Folate	Paul Pottenplackel	
21	Mon Apr 11	9:30-11:45 AM	TBL or Debate/Discussion: Micronutrient Disparities and Social Justice	Saltzman	
22	Weds Apr 13	1:30-3:45 PM	Thiamine	LaJoie	
23	Mon Apr 18	9:30-11:45 AM	Vitamin A and Carotenoids	Wang	Weekly assignment 5 released

24	Weds Apr 20	1:30-3:45 PM	Vitamin A and Carotenoids	Wang	
25	Mon Apr 25	9:30-11:45 AM	TBL or Debate/Discussion: Dietary Supplements	Saltzman	Weekly assignment 5 due
26	Weds Apr 27	1:30-3:45 PM	Review	LaJoie	
27	Mon May 9	9:30-11:45 AM	Final Exam	LaJoie	