

NUTR 6460-090
Metabolism of Micronutrients
Spring 2019

Instructor: Katherine Beals, PhD, RD, FACSM, CSSD
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Email: katherine.beals@hsc.utah.edu or via Canvas
Office Hours: Wednesday 2:00-3:00 pm; Thursday 12:05-1:30 pm; and by appointment.
Class Days/Times: Online
Course Website: Canvas: <https://utah.instructure.com> (*class notes & assignments found here!*)
* Problems: campus "help desk": 801-581-4000 (option 1)

Course Description: (4 credits)

Biochemical and physiological role of vitamins, minerals and trace elements in maintenance of homeostasis in humans. Nutrient deficiency and toxicity syndromes and application of inborn errors of metabolism are discussed as case studies. **Prerequisite:** NUTR Graduate Program students or instructor's consent.

Learning Outcomes: This course is designed to give the student a more detailed and advanced knowledge of nutrition with special emphasis on integrating the principles of nutrition and biochemistry as they pertain to micronutrients. Upon successful completion of this course the student should be able to:

- Describe the historical context of the essential micronutrients.
- Identify recommended dietary intake levels of essential micronutrients for various age and gender groups.
- Describe the processes of digestion, absorption and metabolism of essential micronutrients.
- Identify food sources, physiological functions, deficiency symptoms and toxicity risks of selected micronutrients.
- Evaluate the currently available methods of micronutrient assessment and identify strengths and limitations.
- Explain the potential association between micronutrient intake (at both physiological and supraphysiological doses) and disease states.
- Identify the physiological functions and potential health protective capacities of selected non-vitamin and mineral phytonutrients.
- Analyze scientific literature (i.e., research studies) related to micronutrient intake and metabolism.
- Practically apply concepts of micronutrient metabolism via case studies (i.e., patients or clients).

Required Text/Readings:

- Gropper SS, Smith JL, Carr TP. *Advanced Nutrition and Human Metabolism* 7th ed. Cengage Learning, 2018.
- Articles pertaining to specific topic areas will be available on Canvas

Recommended Readings/Resources:

- Ross AC, et al. *Modern Nutrition in Health and Disease* 11th Edition. Lippincott, Williams, and Wilkins. 2012.
- Dietary Reference Intakes: <http://www.nal.usda.gov/fnic/etext/000105.html>

Teaching and Learning Methods:

The instructor will employ a combination of teaching methods for this course including lectures, instructor and student-led discussions, student presentations and independent research. The goal is to appeal to and engage a variety of learning styles in order to better meet the needs of a diverse group of students

Evaluation of Student Performance

Final grades for the course will be based on the following:

Grading Scale

Exams (4 @ 100 pt)	400
Quizzes (6 @ 10 pt)	60
Phytonutrient Paper & Outline	60
Micronutrient History	40
Journal article presentation/discussion	20
Discussions (4 @ 5 pt each)	20
Total Points Possible	600

A	93-100%	C	73-77%
A-	90-92%	C-	70-72%
B+	88-89%	D+	68-69%
B	83-87%	D	63-67%
B-	80-82%	D-	60-62%
C+	78-79%	F	≤ 59%

- **Exams:** There will be **four** exams each worth 100 points (see calendar for exam dates). Exams will be a combination of multiple choice, true/false, short answer and essay. All exams are administered through **Uonline** (<https://uonline.utah.edu>). You must register for a location and time for each exam prior to taking the exam. You can find registration instructions on Canvas.
- **Quizzes:** There will be **six** quizzes each worth 10 points distributed throughout the semester to assess your understanding of the material covered in each major topic area. The quizzes will be open-book, open-note and will be administered on CANVAS under the quiz icon.
- **Phytonutrient Paper:** In the broad sense of the term, a phytonutrient describes any nutrient that is derived from a plant. Thus, based on this description, vitamins and minerals would fall under the category of phytonutrients. When most people think of phytonutrients however, they think of non-vitamin and mineral nutrients (e.g., lycopene, allicin, sulforaphane, etc). These non-vitamin and mineral phytonutrients are gaining increasing interest from the scientific community and becoming increasingly popular amongst the general public. Each student will choose one (from a list) to research and evaluate via a paper and one-page summary/handout. Details for the assignment will be posted on Canvas.
- **Micronutrient History Paper:** The science of nutrition has advanced considerably over the past 75 years and continues to evolve. This assignment will allow students to explore the historical underpinnings of a micronutrient of his or her choice and compare the state of knowledge during the period of time that the micronutrient was “discovered” to what is known about the micronutrient today. Specific instructions will be posted on Canvas.
- **Journal Article Presentation/Discussion:** The purpose of journal article presentation/discussion is to give students the chance to review, evaluate and share with other students a **recent** research study related to the metabolism of a selected micronutrient. Each student will be responsible for presenting one article to the rest of the class and leading a discussion on Canvas regarding the findings / implications. More details on this assignment will be posted on Canvas under the “assignments” tab.
- **Discussions:** As a result of the journal article presentation/discussion assignment described above, there will be a number of student led discussions. All students in the class will be required to engage in the discussion. Think of this as equivalent to “class participation” in a face-to-face class! ☺

Make-up Policy

- Assignments and/or projects are due **during class** on the due dates as designated by the instructor. **Late projects (≤ 1 week late) will receive ½ credit. Assignments turned in more than 1 week late will receive NO credit.**
- Missed exams may **NOT** be made up unless extreme extenuating circumstances exist. If there is a conflict with an exam date, the student may arrange with the instructor to take the exam early.

ADA Statement

- The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability Services. (www.hr.utah.edu/oeo/ada/guide/faculty/)

Code of Student Rights and Responsibilities

- The Code of Student Rights and Responsibilities is provided in detail on the University of Utah web page (www.admin.utah.edu/ppmanual/8/8-10.html). Students have specific rights in the classroom as detailed in the code. The code also specifies proscribed conduct that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully to become aware of these issues. Students may receive sanctions for violating one or more of these proscriptions. The instructor of this course will enforce the Code in the course; cheating and plagiarism will result in appropriate penalties, such as a failing grade on a specific exam or in the course and/or expulsion from the course. Students have the right to appeal such action to the Student Behavior Committee.

Title IX

- Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Wellness Statement

- Wellness Statement: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness; www.wellness.utah.edu; 801-581-7776.

Tentative Course Outline*

Week Of...	Topic	Readings
Jan 7	Introduction to Vitamins & Minerals; History & Utilization of the RDAs/DRIs & Micronutrient Assessment	*Assigned Readings
Jan 14	Micronutrient Digestion/Absorption General vitamin classification— B vitamins overview	*Assigned Readings Gropper pp 307-310
Jan 21	Thiamin, Riboflavin & Biotin	Gropper pp 312-324; 335-341
Jan 28	Pantothenic Acid, Niacin & Vitamin B6	Gropper pp 325-341; 358-364
Feb 4	EXAM 1	
Feb 11	B12 & Folate	Gropper pp 341-358
Feb 18	Free Radicals, Antioxidants & Vitamin C & Vitamin E	Gropper pp 303-312; 401-408; 416-423.
Feb 25	Vitamin A, β Carotene & Vitamin K	Gropper pp 370-388; 408-414
March 4	EXAM 2	
Mar 11	Spring Break	
March 18	Bone Metabolism & Bone Nutrients (Vitamin D & Calcium)	Gropper pp 389-400; 425-454; 543-546
March 25	Bone Nutrients (Phosphorous, Magnesium & Fluoride)	Gropper pp 389-400; 425-454; 543-546
April 1	Electrolytes (sodium, potassium, chloride)	Gropper Chapter 12
April 8	EXAM 3	
April 16	Trace Minerals: Iron & Copper & Chromium	Gropper pp 479-499; 509-518; 525-528
April 22	Trace Minerals: Zinc & Iodine & Selenium	Gropper pp 499-509; 518-525; 528-533;
April 25- May 1	EXAM 4	

***Course Navigation:** This course is organized in modules that will span anywhere between one -two weeks. Each module will contain lecture notes, readings and assignments. Please be sure that you review all the requirements for the module and take note of the due dates so that you can stay on top of the material and don't fall behind.