

## **NUTR 620: Human Metabolism: Micronutrients**

**Instructors:** Melinda Beck, PhD  
2303 MHRC  
Office Hours: email to make an appointment  
Email: [melinda\\_beck@unc.edu](mailto:melinda_beck@unc.edu)

Ian Hines, PhD  
Email: [ihines@med.unc.edu](mailto:ihines@med.unc.edu)

Patricia Sheridan, PhD  
Email: [patricia\\_sheridan@med.unc.edu](mailto:patricia_sheridan@med.unc.edu)

**TA:** Michael DePetrillo      [mdepetri@email.unc.edu](mailto:mdepetri@email.unc.edu)

**Review Sessions:** Tuesdays, 1-2 pm in 2213 McGavran (optional)

**Time/Place:** Spring 2009    11:00-12:15 T,R in 2301 McGavran-Greenberg

**Prerequisite:** Nutr. 600

**Course Description:** Cell biochemistry and physiology, emphasizing integration of vitamins and minerals in maintaining cell functions, regulation of gene expression, control of oxidative stress, DNA methylation, alcohol, heart failure and cancer.

**Textbooks:** All lecture material will be posted on Blackboard prior to lecture date. Highly recommended: Present Knowledge in Nutrition, 9<sup>th</sup> edition, Volumes I and II.

### **Course Objectives:**

This course is a continuation of Nutrition 600. In Nutr 600, you learned about human metabolism from the viewpoint of macronutrients and their importance in health and disease. In this course, you will continue your study of human metabolism with a focus on the micronutrients: vitamins and minerals. The course will include critical thinking/case reports to help integrate what you're learning with "real life" situations.

By the end of this course, the student should be able to:

1. Explain the non-gene effects of vitamins A, C and K on normal physiology and what happens during deficiency states.
2. Explain the importance of DNA methylation and the roles of folate, betaine, and choline in this process
3. Explain the role of B vitamins on normal physiology and what happens during deficiency states.
4. Explain the role of vitamin D in bone formation and the importance of Ca<sup>2+</sup>, P, Mg<sup>2+</sup>, and F<sup>-</sup> in bone mineralization.
5. Explain the importance of NaCl and Mg<sup>2+</sup> in normal cell homeostasis and fluid balance.
6. Understand how nutrition and genetics can interface.
7. Explain the role of vitamins A and D on gene regulation.
8. Explain alcoholic liver disease and the role of nutrition

9. Understand how iron is involved in oxygen transport and what happens during deficiency.
10. Understand the roles of Se, Cu, Iodine, Manganese, Chromium, Fluoride and Zn in maintaining cellular health.
11. Explain oxidative stress and the cellular mechanisms involved in controlling/handling production of radicals.
12. Explain hypertension and congestive heart failure and how nutrition plays a role in these diseases.
13. Understand how selected supplements can interact with normal physiology.

**Grading:** There are 3 exams and 1 final exam, dates are noted in the syllabus. In addition, some of the critical thinking sessions may be graded and count 5-10% of the next in-class exam. Each of the 3 in-class exams will comprise 20% of the grade. The first part of the final exam covers the last fourth of the semester (20%) and the second part is a cumulative exam covering the first  $\frac{3}{4}$  of the course (20%). There are no make-up exams without Dr. Beck's permission obtained prior to the scheduled exam. Unless you are told otherwise, you are responsible for all material posted on Blackboard.

**Honor Code at the University of North Carolina.** The principles of academic honesty, integrity, and responsible citizenship govern the performance of all academic work and student conduct at the University as they have during the long life of this institution. Your acceptance of enrollment in the University presupposes a commitment to the principles embodied in the Code of Student Conduct and a respect for this most significant Carolina tradition. Your reward is in the practice of these principles.

Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code. Academic dishonesty in any form is unacceptable because any breach in academic integrity, however small, strikes destructively at the University's life and work.

I expect that all in-class exams will be taken without the assistance of books, notes, other people, or looking at exams of fellow classmates. You sign a pledge on each exam that indicates "On my honor, I have neither given nor received unauthorized aid on this assignment".

If you have any questions about your responsibility or the responsibility of faculty members under the Honor Code, please consult with someone in either the Office of the Student Attorney General (966-4084) or the Office of the Dean of Students (966-4041).

Nutr 620: Human Metabolism: Micronutrients

<b>DATE</b>	<b>TOPIC</b>	<b>INSTRUCTOR</b>	<b>MATERIALS</b>
1/13	Vitamin A and carotenoids	Beck	PN: 157-197 Blackboard
1/15	Vitamin A and carotenoids	Beck	PN: 157-197 Blackboard
1/20	Vitamin C	Beck	PN: 233-241 Blackboard
1/22	Vitamin D, Ca <sup>2+</sup> , P	Beck	PN: 198-210 and 373-408 Blackboard
1/27	Vitamin D, Ca <sup>2+</sup> , P	Beck	PN: 198-210 and 373-408 Blackboard
1/29	Critical Thinking: Osteoporosis	Beck	
2/3	Vitamin K	Beck	PN: 220-232 Blackboard
2/5	Iron	Beck	PN: 430-444 Blackboard
2/10	Critical Thinking: Anemia	Beck	
2/12	<b>EXAM 1 (1/13-2/10)</b>	Beck	
2/17	Na <sup>+</sup> , Cl <sup>-</sup> , and Renal Function	Beck	PN: 409-429 , 735-746 Blackboard
2/19	Critical Thinking: Renal Disease		
2/24	Thiamine/riboflavin/niacin	Beck	PN: 242-268 Blackboard
2/26	Vitamin B <sub>6</sub> /biotin/panthothenic acid	Beck	PN: 269-277; 314-339 Blackboard
3/3	Folate/choline/vitamin B <sub>12</sub>	Beck	PN: 278-313; 352-360 Blackboard
3/5	<b>EXAM 2 (2/17-3/5)</b>	Beck	Blackboard
3/10	<b>SPRING BREAK</b>		
3/12	<b>SPRING BREAK</b>		
3/17	Nutrition and Cancer	Zeisel	Blackboard
3/19	Se, Cu, Zn	Sheridan	PN: 480-497; 458-470;445-457 Blackboard
3/24	Se, Cu, Zn	Sheridan	PN: 480-497; 458-470;445-457 Blackboard
3/26	Chromium, Fluoride, Manganese, Iodine	Beck	PN 498-526 Blackboard
3/31	Chromium, Fluoride,	Beck	PN 498-526

	Manganese, Iodine		Blackboard
4/2	Oxidative Stress and Antioxidants	Beck	Blackboard
4/7	Oxidative Stress and Antioxidants	Beck	Blackboard
4/9	Critical Thinking: Oxidative Stress	Beck	
4/14	<b>EXAM 3 (3/17-4/9)</b>		
4/16	Alcoholic Liver Disease	Hines	Blackboard
4/21	Hypertension and Congestive Heart Failure	Hines	Blackboard
4/23	Supplements	DePetrillo	Blackboard
4/24 and 4/27 1-3 pm	<b>REVIEW SESSIONS FOR FINAL EXAM</b>	DePetrillo	2213 McGavran
4/29 8 am	<b>FINAL EXAM: Part 1 covers 4/10-4/23. Part 2 covers entire course</b>	Beck	Blackboard

Blackboard notes/materials will be posted prior to the lecture. PN: Present Knowledge in Nutrition, 9<sup>th</sup> edition.