

Department of Nutrition, Gillings School of Global Public Health
University of North Carolina at Chapel Hill

NUTR 696-072

**Advanced Nutritional Biochemistry:
Oxidative Stress and Nutritional Antioxidants
in Human Health and Disease
(2 credits)**

Fall 2010

I. COURSE DESCRIPTION

Oxidative stress is an underlying factor in a number of common human diseases, including cancer, cardiovascular disease, and diabetes mellitus. Dietary antioxidants and specialized enzymes represent a backbone of the antioxidant defense system in human tissues. This course is designed to provide basic information about molecular mechanisms that are targeted by these species, and about the association between damage caused by these species and etiology of human diseases. A significant part of the course is devoted to nutritional antioxidants and their roles in prevention and treatment of these diseases.

This course will consist of two introductory lectures and several thematic blocks. Each of these blocks will include notes presented by the Instructor on a specific topic, followed by oral presentations by students on published papers related to this topic (provided by the Instructor). **Each student will be required to participate in discussion of and submit a written critique on each topic/paper covered by the course.** The written critiques should consist of the following: 1) Briefly describe the experiments and results. 2) What hypothesis is being tested? 3) Are the controls adequate? 4) Is the study well-designed? 5) Are there alternative explanations for the findings? 6) Is it physiologically relevant? 7) What additional experiments would you suggest based on these results - either to expand the findings or provide a better experimental model.

NUTR 696-072 meets on **Thursdays** from **2:00 - 3:50 AM** in **241 Rosenau.**

Pre-requisites: BIOL011, CHEM102, NUTR400 (or similar chemistry and biochemistry and courses).

II. INSTRUCTOR

Miroslav Styblo, Ph.D.

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Office Hours: By appointment

III. TEXTBOOK

No text book is required for this course. Papers related to the topics covered by the course will be provided by the Instructor.

IV. LEARNING OBJECTIVES

By the end of this course, students will have a basic understanding of:

1. Molecular mechanisms responsible for the formation of free radicals, reactive oxygen species (ROS) and reactive nitrogen species (RNS);
2. Specific cellular and molecular structures targeted by ROS and RNS;
3. Methods used to measure oxidative stress and to quantify ROS and RNS;
4. The role of ROS and RNS in physiological processes and in etiology of human disease;
5. The antioxidant defense system and its role in protection against oxidative stress.
6. Dietary sources of antioxidants and the role of antioxidants in prevention and treatment of common human diseases.

V. ASSESSMENT/GRADING

Participation in the discussion and the written critiques for each topic will be graded with maximum 50 points each (i.e., 100 points/class). The final grade will be calculated as arithmetical mean for all topics covered by the course (i.e., each class will be given equal weight toward the final grade).

VI. ATTENDANCE POLICY

Students are expected to attend class regularly. Students are responsible for all materials and assignments discussed in class whether they are in attendance or not. Students are expected to be in class on time with cell phones turned off. It is distracting to your fellow students and to the presenter when you come in late.

VII. HONOR CODE

The Honor Code is in effect in this class and all others at the University. We are committed to treating Honor Code violations seriously and urge all students to become familiar with its terms set out at <http://instrument.unc.edu>. If you have questions, it is your responsibility to ask the Course Instructors about the Code's application. All written work and other projects must be submitted with a statement that you have complied with the requirements of the Honor Code in all aspects of the submitted work.

COURSE OUTLINE

No	Date	Faculty	Topic	Student Participation in Discussion and Written Critiques
1	August 26	Styblo	<i>Short Quiz testing students' knowledge of chemistry, biochemistry and nutrition</i> Lecture: Introduction to Oxidative Stress – Sources and Targets of ROS and RNS	Not required
2	September 2	Styblo	Lecture: Oxidative Stress, Antioxidants, and Human Disease	Not required
3	September 9	Styblo	Physiological Functions of ROS and RNS (I)	Required
4	September 16	Styblo	Physiological Functions of ROS and RNS (II)	Required
5	September 23	Styblo	Oxidative Stress, Antioxidants and Disease: DNA Damage and Cancer	Required
6	September 30	Styblo	Oxidative Stress, Antioxidants and Disease: Multiple sclerosis	Required
7	October 7	Styblo	Oxidative Stress, Antioxidants and Disease: Alzheimer's Disease	Required
8	October 14	Styblo	Oxidative Stress, Antioxidants and Disease: Parkinson's disease	Required
9	October 21	Styblo	Oxidative Stress, Antioxidants and Disease: Ischemic Stroke	Required
10	October 28	Styblo	Oxidative Stress, Antioxidants and Disease: Multiple sclerosis	Required
11	November 4	Styblo	Oxidative Stress, Antioxidants and Disease: Cataract	Required
12	November 11	Styblo	Oxidative Stress, Antioxidants and Disease: Metabolic Syndrome & Diabetes	Required
13	November 18	Styblo	Oxidative Stress, Antioxidants and Disease: Obesity	Required
14	November 25	Styblo	Oxidative Stress, Antioxidants and Environmental Health/Disease	Required
15	December 2	Styblo	Oxidative Stress, Antioxidants and Aging	Required
16	December 9	Styblo	Methodology for Assessment of Oxidative Stress	Required