

Free Radicals and Antioxidants Biology 306

Professor Barry Logan



Meeting time: Monday and Wednesday: 11:30 - 12:55

Location: Druckenmiller 004

Barry Logan's contact information:

Office: 220A

Phone: 725-3944

e-mail: blogan@bowdoin.edu

Prerequisites: Any 200-level course in Biology

Textbook: *Free Radicals in Biology and Medicine (4th ed.)* Halliwell & Gutteridge

This text is the standard-bearer of the discipline. Halliwell and Gutteridge are excellent writers and I find the book readable, but the depth and breadth of material are evermore challenging (consider this a symptom of our growing appreciation for the importance of this topic). Read the text; it will facilitate classroom discussions.

Course philosophy:

I intend for this course to be part an introduction to oxidative stress, part a survey of its relevance in diverse biological systems, part hands on (with some practical lab advice thrown in), and part graduate school-like seminar. During the semester I will lecture, we will perform experiments, and you will lead discussions. Regardless of the format of a given day, I expect it to be entirely interactive. Speak up and get involved.

Free Radicals and Antioxidants – Biology 306 Syllabus

| Date | Topic | Reading¹ |
|-------------|--|----------------------------|
| Jan. 21 | Introduction & Chemistry of Reactive Oxygen Species (ROS). | 1 |
| 23 | The Chemistry of ROS & The Cellular Damage They Cause | 2 |
| 28 | ROS Damage & Diet-Derived Antioxidants | 4.8-4.14; 3.1, 3.20-3.22 |
| 30 | Diet-Derived Antioxidants & The French Paradox | 3.20-3.22 |
| Feb. 4 | <i>Experiment: The Scavenging Capacity of Red Wine</i> | |
| 6 | Methods of Detecting ROS | 5 |
| 11 | Enzymatic Antioxidants | 3.2-3.9 |
| 13 | Enzymatic Antioxidants | 3.2-3.14 |
| 18 | ROS and Signal Transduction | 4.5 |
| 20 | Beneficial Aspects of Oxidative Metabolism | 7 |
| 25 | <i>Mid-Term Exam</i> | |
| 27 | Cancer | 9.13-9.15 |
| March 3 | Cancer & The CARET Study | 9.13-9.15, 8.12 |
| 5 | Aging | 10 |
| 24 | Aging | 10 |
| 26 | Discussion of Garry Buettner's Research | |
| 27 – 4PM | <i>Seminar by Garry Buettner [Note: This is outside of our scheduled meeting time]</i> | |
| 31 | Malaria and 'Inborn Errors of Metabolism' | 6.6 |
| April 2 | Malaria and 'Inborn Errors of Metabolism' | 6.6 |
| 7 | Student Talks on ROS and Disease | |
| 9 | Student Talks on ROS and Disease | |
| 14 | Student Talks on ROS and Disease | |
| 16 | Student Talks on ROS and Disease | |
| 21 | Student Talks on ROS and Disease | |
| 23 | Plants and Light: Managing Too Much of a Good Thing | |
| 28 | Plants and Light: Managing Too Much of a Good Thing | |
| 30 | HPLC Analysis of Plant Carotenoid Composition | |
| May 5 | HPLC Analysis of Plant Carotenoid Composition | |
| 7 | Megavitamin Supplements & Wrap-up | |

¹ These readings will be supplemented by materials from the primary and review literature.

Grading

Your grade will be determined based upon the following:

| | |
|--|----------------|
| Mid-Term Exam | 30% |
| Final Exam | 15% |
| Analysis and Presentation of Experimental Data | 2 X 5% |
| Presentation on ROS and Disease | 25% |
| Paper on ROS and Disease | 20% |
| Participation and Involvement | The "X" Factor |

The Academic Honor Code [*excerpted from the Student Handbook*]

The success of the Academic Honor Code requires the active commitment of the College community. Bowdoin College expects its students to be responsible for their behavior on and off the campus and to assure the same behavior of their guests. Uncompromised intellectual inquiry lies at the heart of a liberal education. Integrity is essential in creating an academic environment dedicated to the development of independent modes of learning, analysis, judgment, and expression. Academic dishonesty, in or out of the classroom, is antithetical to the College's institutional values and constitutes a violation of the Honor Code. The Academic Honor Code plays a central role in the intellectual life at Bowdoin College. Students and faculty are obligated to ensure its success.

III. Proscribed Conduct

The following sections describe activities constituting breaches of the Academic Honor Code.

1. "Academic Dishonesty" includes but is not limited to (1) *the receiving, giving, or using of any assistance on quizzes, tests, written assignments, examinations or laboratory assignments;* (2) *references to sources beyond those authorized by the instructor in preparing papers, constructing reports, solving problems, or carrying out other academic assignments;* (3) *inadequate citation of sources;* (4) *acquisition, without permission, of tests, computer files or similar material which would give the student an unfair advantage on an assignment or examination;* (5) *submission of academic work not a student's own original effort;* (6) *use of the same work for multiple courses without prior knowledge of the receiving instructors;* (7) *depriving learners of access, including computer access, to library information through intentional monopolization, mutilation, defacing, unauthorized removal of books or other materials from College libraries, or purposeful failure to return library materials on a timely basis;* (8) *unauthorized altering of academic records (transcripts, grading sheets, Course Registration Cards, etc.).*
2. A number of Bowdoin College courses employ various kinds of collaborative assignments in several different situations, including homework, laboratory reports, and in-class assignments. When preparing such course work, students should follow the individual instructor's policy on collaboration. When the instructor permits collaboration among students, the use of another student's work or ideas should be credited properly.
3. It is the obligation of students to be thoroughly familiar with proper citation of sources and to consult and refer to authoritative style guides for research papers. New students will receive a copy of Sources during Orientation. Students should keep this booklet for reference throughout their years at Bowdoin. The Bowdoin College Library Web site provides links to style guides at <http://www.bowdoin.edu/dept/library/eref/write.html>. Students are particularly encouraged to consult the MLA Style Guides, Sources, and Bibliographic Formats for Citing Electronic Information. Plagiarism is possible with any work performed in any medium and any scholarly discipline. Plagiarism involves the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment in all such scholarly work as essays, examinations, quizzes, oral/written reports, homework assignments, laboratory reports, computer programs, music scores, choreography, graphic depictions, and visual representations. Plagiarism also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.