

BES311 Environmental Chemistry Course Syllabus-Spring 2006

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Office Hours: By appt.
Class Times: To be arranged.
Mid Term Exam: To be arranged in week 6 of course.

Final Exam: To be arranged in Final Exam Week

Writing Assignment: Individual papers due on Jun 4, with preliminary materials due on Apr 24, May 8, and May 27.

Texts: Environmental Chemistry, 3rd edition, by Colin Baird and Michael Cann, (W.H. Freeman and Co, New York, 2004)

Supplementary Material: These journal articles and book chapters are required reading in the course. The following are available electronically on the UWB web site
<http://eres.bothell.washington.edu/>

- de Gruijl Frank R et al, “Health effects from stratospheric ozone depletion and interactions with climate change”, Photochem. Photobiol. Sci., Vol 2, 2003, pp 16-28.
- Kappos Andreas D et al., “health effects of particles in ambient air”, Int. J. Hyg. Environ. Health Vol 207 (2004), pp 399-407.
- Driscoll Charles T., et al. “Acidic Deposition in the Northeastern United States: Sources and Inputs, Ecosystem Effects, and Management Strategies”, BioScience Vol 51, No. 3, (March 2001), pp 180-198.
- Chevrier Cecile, Junod Bernard, and Cordier Sylvaine, “ Does Ozonation of Drinking Water Reduce the risk of Bladder Cancer”, Epidemiology, Vol 15, No 5 (Sep 2004), pp 605-614.
- Goebell Peter et al, “Environmental exposure, chlorinated drinking water, and bladder cancer”, World J. Urol. Vol 21 (2004), pp 424-432.
- Rennie John, ed et al., “Misleading Math about the Earth”, Scientific American, Jan 2002, pp 61-71.
- Lomborg Bjorn, “The Skeptical Environmentalist Replies”, Scientific American, May 2002, pp 14-15.
- Richter Elihu D and Chlamtac Noga “Ames, Pesticides, and Cancer Revisited” Int. J. Occup. Environ. Health vol 8 (2002), pp 63-72.

- Ames, Bruce N. and Lois Swirsky Gold., "Environmental Pollution, Pesticides, and the Prevention of Cancer: Misconceptions", *FASEB Journal* v 87; November 1997, 1041-1052.
- Mielke, Howard W., "Lead in the Inner Cities", *American Scientist* v 87; January-February (1999) 62-73.
- Brown Sally et al, "In situ Soil Treatments to Reduce the Phyto- and bioavailability of Lead, Zinc, and Cadmium", *J. Environ. qual.* vol 33 (2004), pp 522-531.

Other required articles may be added during the course of the term.

Course Description

BES 311 Environmental Chemistry

(Charles F. Jackels)

In this course students will use the fundamental principles of chemistry to gain an understanding of the source, fate, and reactivity of compounds in natural and polluted environments. Emphasis will be placed on the environmental implications of energy utilization and on the chemistry of the atmosphere, hydrosphere, and lithosphere. Environmental issues that will be discussed include climate change, air pollution, stratospheric ozone depletion, pollution and treatment of water sources, and the utilization of insecticides and herbicides.

Course Goals

The overall goal of this course is to gain an understanding of the fundamental chemical processes that are central to a range of important environmental problems and to utilize this knowledge in making critical evaluations of these problems. Specific goals include:

- An understanding of the chemistry of the stratospheric ozone layer and of the important ozone depletion processes.
- An understanding of the chemistry of important tropospheric processes, including photochemical smog and acid precipitation.
- An understanding of the basic physics of the greenhouse effect and of the sources and sinks of the family of greenhouse gases.
- An understanding of the nature, reactivity, and environmental fates of toxic organic chemicals.
- An understanding of societal implications of some environmental problems
- Experience in preparing a formal written report on library research.

Background

The prerequisites for this course include two quarters of a general chemistry sequence, equivalent to CHEM 142-152. (*See the Chemistry Department course descriptions for further information: <http://www.washington.edu/students/crscat/chem.html>*)

Research Papers

There will be one major writing assignment during the course of the term. This assignment will be a 10-12 page independent research paper on some aspect of environmental chemistry or of an

environmental problem with a significant chemical component. *A detailed description of this assignment will be given out during the first week of the course.*

The paper will be expected to provide a clear, effective, and convincing presentation of your ideas in addition to an accurate and effective presentation of the relevant scientific concepts. This assignment will be graded for all the usual aspects of presentation (grammar, spelling, word choice, organization, etc.) as well as for quality of research and effective communication.

During the early phases of this assignment, annotated bibliographies, complete outlines, brief proposals, and rough drafts will be turned in electronically by each person for comment and discussion. With the possible exception of the rough draft, these required preliminary materials will be graded and will be returned to you (electronically) with my comments. Twenty percent of your paper's final grade will reflect the quality of this preliminary material and your responses to my comments.

All late papers will be penalized 10%, and they will not be accepted more than one week late .

Class Participation, Homework and Workgroup Problems.

Significant class time will be spent in discussion and student presentation mode. Students or workgroups will be contributing to and leading discussions of the material we have read. Students will be graded based on their participation in these class discussions.

There will be several homework problem assignments given during the term. They may take the form of essay questions, quantitative problems, or abstracts of papers to be read.

The homework assignments and general in-class participation will be graded and contribute 20% to your overall grade. (In some cases only selected problems from a particular assignment will be graded.)

Back-up Copies

You are responsible for maintaining back-up copies of all assignments. If an assignment should be lost or misplaced during the submission or grading process, it is your responsibility to provide a copy of that assignment upon request.

Journals

You will be expected to maintain a bound journal with your notes from the papers we read during the course of the term. Each time you read one of these papers or we discuss one in class, you are to enter your notes in the journal. You will be allowed to use this journal during the exams when there are questions that may pertain to the readings. It is not meant to contain the class handouts that I provide.

Test and Final Exam

The midterm examination will cover approximately 1/2 of the course material. The final exam will review the entire course as well as more intensively cover the last 1/2 of the course material.

Because scientific knowledge is cumulative, the tests and examinations will always have a cumulative nature to them. The tests and exams will be mixtures of quantitative chemical problems, short answer questions and short essay questions. Very few multiple choice questions will be used; there will be no True/False questions. Most exam and test questions will be graded primarily for scientific content and your understanding of the concepts involved. Errors in grammar, spelling, etc., will influence these grades to the extent that they make it difficult to understand your reasoning and explanations. If a particular exam question is to be specifically graded for good grammar, style, etc., it will be identified as such on the exam

Documented Disabilities

To request academic accommodations due to a disability, please contact Disabled Student Services (DSS) in the Counseling Center, (425)352-5000, (425) 352-5303 (TDD). If you have a documented disability on file with the DSS office, please have your counselor contact me and we can discuss accommodations.

Academic Honesty

The highest standards of academic honesty will be expected in this class. Cheating and plagiarism in any of their forms are unacceptable. At the least, a grade of zero will be assigned to any work that is the product of cheating or plagiarism. Plagiarism is also discussed in the 1993-1995 UW Bothell Catalog:

"Plagiarism is the use of the creations, ideas or words of someone else without formally acknowledging the author or source through appropriate use of quotation marks, references, and the like. Plagiarizing is stealing someone's work and presenting it as one's own original work or thought. Student work in which plagiarism occurs will not ordinarily be accepted as satisfactory by the instructor, and may lead to disciplinary action against the student submitting it. Any student who is uncertain whether his or her use of the work of others constitutes plagiarism should consult the course instructor for guidance before formally submitting the course work involved."

Work that is assigned to you alone is to be assisted by no one else. Work that is assigned to you and your partner is to be accomplished by no one except the two of you. The official UWB information on academic integrity is to be found at <http://www.uwb.edu/students/policies/integrity.html>. Each student is responsible to read and understand that information. *It is your responsibility to clarify with me any uncertainty that may exist on this question. Do not assume that an action is acceptable; ask me to be sure.*

Grades.

The final grade will be determined numerically by averaging your scores with the following weights:

Final Exam	30%
Midterm Exam	25%
Paper	25%
Homework/ /Participation	20%

Most grades given during the course of the term will be based on a 100-pt scale. The **official decimal class grades** (0.0 - 4.0) will be determined from a weighted average of your individual grades. A weighted average of 96 will be assigned a decimal grade of 4.0, and a weighted average of 55 will be assigned a decimal grade of 0.7. Intermediate grades will be determined by a linear relationship between these two limits. This scale represents a *minimum* decimal grade. If I judge it to be appropriate, I will give higher grades than those indicated by this scale. Based on past experience, the class GPA will likely fall in the range 2.7-3.2 (a “B” average).

The following table represents the official UW conversion of standard letter grades to the UW decimal grade scale and the conversion to the 100-pt scale used in this class:

	A Range		B Range			C Range			D Range		
Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Min Decimal	3.9	3.5	3.2	2.9	2.5	2.2	1.9	1.5	1.2	0.9	0.7
Min 100-pt	95	90	86	82	77	74	70	65	61	57	55

Library Materials:

Many useful reference materials are to be found in one of the UW libraries on the UWS campus rather than at UWB. These can be obtained with little effort via electronic document delivery or the courier service. Make sure you know how to use this service.

The electronic reserve page for the course has a number of journal articles that we will be reading during the course of the term. If you wish hard copies of these articles, you are responsible for printing them. There is a link to the E-Reserve on the course home page.

Use of E-Mail

You will be required to use e-mail as part of this course. Since our personal contact hours are quite limited, this can become a major avenue for our communication. In addition, I will use the class e-mail list, listserve, and web page as means of broadcasting information to the class. It is assumed that class members are reading their e-mail on a daily basis. You may, of course, read your e-mail anywhere of your choosing, but it is required that you will have an active account of the form UWNetID@u.washington.edu that you check daily or forward. You can set up your account from the UW Web page. There is also a link on our course home page that takes you to UW online documentation that explains how to set up an account, how to send e-mail, etc.

Electronic Submission of Assignments

Most assignments for this course will be submitted electronically. The E-submit site for this purpose is found at:

<https://catalyst.washington.edu/webtools/secure/esubmit/turnin.cgi?owner=jackels&id=4261>

Course Home Page

My personal home page is found at the URL:

<http://faculty.washington.edu/jackels>

The following is a rudimentary course home page:

<http://faculty.washington.edu/jackels/bes311.s06/>

Tentative Class Schedule (subject to change)

DATE	READING	TOPICS
Mar 27-29 Week I	Ch 1, Baird <i>Paper by de Gruijl et al</i>	Course introduction; Intro to atmospheric chemistry. Stratospheric ozone depletion. Health aspects of ozone depletion
Apr3-5 Week II	Ch 2, Baird. <i>Paper by Kappos et al.</i> <i>Paper by Driscoll et al</i>	Intro to tropospheric chemistry Tropospheric chemistry, especially smog and aerosols, acid-base chemistry of natural waters. Acid deposition; aluminum in rivers and lakes.
Apr10-12 Week III	.. Ch3, Baird	Continuation and Detailed atmospheric chemistry
Apr 17-19 Week IV	Ch 9, Baird.	Continuation of atmospheric and Chemistry of Natural Waters Preliminary Paper submission #1 (Apr 24);
Apr 24-26 Week V	Ch10, Baird.	Continuation ; Pollution and purification of water
May 1-3 Week VI	<i>Paper by Chevrier, Junod and Cordier</i> <i>Paper by Goebell et al.</i> Ch 11, Baird;	Continuation and Toxic heavy metals; Midterm exam (take home)
May 8-10 Week VII	<i>Paper by Mielke</i> <i>Paper by Brown</i> Chapter 7, Baird.	Conclusion about heavy metals Toxic organics: pesticides. Preliminary Paper Submission #2 (May 8),
May 15-17 Week VIII	Chapter 8, Baird <i>Paper by Ames and Gold</i> <i>Paper by Richter and Chlamtac</i>	Toxic organics other than pesticides Dioxin Health Hazards
May 22-24 Week IX	Ch 4, Baird	Global Warming; Climate change Writing Assignment Rough Draft Due (May 27)
May 29-31 Week X	Ch 5, Baird. <i>Paper by Rennie</i> <i>Paper by Lomborg</i>	Continuation of climate change. Writing Assignment Due (Jun 4)
June 5		Final Examination