

BES311 Environmental Chemistry Course Syllabus-Winter 2011

Instructor: Charles F. Jackels
Office: Room UW2- 312
Office Phone: (425) 352-5368
E-Mail: jackels@u.washington.edu
FAX: (425) 352-5216

Office Hours: Wednesdays, 11AM-12 noon and 2-3 PM, UW2-312, and by appointment. It is best to check with me ahead of time, even for a visit during normal office hours, especially if you are making a special trip for that purpose. I am in my office for considerable periods every day (approximately 9-5) and will be glad to make appointments outside of the nominal office hours.

Class Times: 8:45 – 10:45 AM, Mondays and Wednesdays, UW1-061

Prerequisite: Full year of general chemistry (BCUSP 162)

Mid Term Exams: In Class, Jan 26 and Feb 23

Final Exam: In Class, March 14.

Research Project: To be done in pairs, with detailed assignment to follow. .

Texts: Environmental Chemistry, 4th edition, by Colin Baird and Michael Cann, (W.H. Freeman and Co, New York, 2008)

Supplementary Material: In addition to the course text, several articles may be posted for you to read. They will be found at:
<http://eres.bothell.washington.edu/>

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 gaining:

- 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, the sources and sinks of the family of greenhouse gases, and the implication for climate change.
- An understanding of the nature, reactivity, and environmental fates of toxic organic chemicals.
- An understanding of the chemistry of natural waters and of their pollution and purification.
- The ability to research an important environmental chemistry problem and prepare a formal presentation and white paper on that problem.

Background

The prerequisites for this course include three quarters of a general chemistry sequence, equivalent to BCUSP 142-162.

Research Project

There will be one major research assignment during the course of the term. This assignment will be carried out with a partner and will culminate in a half-hour formal presentation to the class and a short written white paper to be distributed at the presentation. There will be several graded intermediate milestone deliverables during the term. *A detailed description of this assignment will be given out during the first week of the course.*

The presentation and 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 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 for comment and discussion. These preliminary submissions will be graded and returned with 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 deliverables will be subject to a grade penalty.

Class Participation and Homework Problems.

Class Participation. Significant class time will be spent in discussion, active learning, in-class problem solving, occasional in-class quizzes, and student presentation. Students will be assigned grades based on their participation in these class activities as well as follow-up questions to be done after class. The greatest part of this grade by far will come from completing the active learning activities in class. *If you are missing from class, you cannot make up the participation grade.*

Homeworks. There will be several graded individual homework problem assignments (HW's) given during the term. They may take the form of short answers, quantitative exercises, or general problem solving. Generally, these will be individual efforts, but ones that permit consultation with your partner. The detail and extent of grading will vary from week to week, depending on the time available. *In most cases, the homeworks will only be turned in electronically.*

Back-up Copies. You are responsible for maintaining back-up copies of all assignments, computer programs, etc. 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. Always maintain current backup copies of all of your work. Computer crashes do not qualify as “emergencies” in this class.

Midterm and Final Exams

The midterm examinations will each cover approximately 1/3 of the course material. The final exam will review the entire course as well as more intensively cover the last 1/3 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.

Classroom Rules. These basic rules, in addition to the requirements of the UWB Handbook, apply to the instructor and all students at all times in the classroom. If you cannot observe them at any time, you are expected to leave the classroom:

- No use of computers for web surfing, e-mail, or any other activities not directly related to class.
- No headphones, blue tooth earphones, etc in the classroom.
- No cell-phone calls, rings, musical interludes, etc., during class.
- All views are to be heard and engaged respectfully. As scholars, we are expected to analyze subject matter critically and express reasonable positions that are based on logic and fact rather than on emotion. **In no case are *ad hominem* arguments permitted in BES 311.**

Attendance: Class & Exams. Any excuse for missing an exam *other than illness or family emergency* must be cleared with me at least one week ahead of time. If you cannot attend class on an exam day because of illness or emergency, you are expected **before class** to contact me by phone, leave a voice mail message, leave a message for me with the Interdisciplinary Arts and Science office, or leave me an e-mail message. Failure to notify me in one of these ways may result in you not receiving consideration for a make-up examination.

Regular class attendance is expected, although roll calls will not be generally taken. If you are not present to participate in class activity, that will, of course, profoundly affect your grade on that collaborative assignment. *Collaborative problem solving is a goal of this course.* Missed in-class work (for whatever reason) *cannot* be made up.

Late Assignments. Most course assignments have due dates, which provide a framework that assures mastery of certain concepts before moving on to other more complex ones. These dates also allow me to determine how well you achieve mastery of certain concepts in an allocated amount of time. They also provide assurance of equity and fairness to all class members. Assignments with due dates will not be accepted late, *unless otherwise noted in the assignment instructions or at the Catalyst Drop Box.* If you are out of town on an assignment due date, it is your responsibility to arrange for internet access and submit the assignment electronically or to submit it before you leave. Some of the assignments allow late submission for a short period with a significant penalty.

Documented Disabilities

The University of Washington is committed to providing equal opportunity and reasonable accommodation in its services, programs, activities, education and employment for individuals with disabilities. If you believe that you have a disability and would like academic accommodations, please contact Disability Support Services at 425.352.5307, 425.352.5303 TDD, 425.352.3581 FAX, or atdss@uwb.edu. DSS will be happy to provide assistance. You will need to provide documentation of your disability as part of the review process.

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. Work that is assigned to you alone is to be accomplished by you alone. When formal collaboration on assignments is permitted that fact will be made explicit. Assume that all assignments are to be individual work unless I indicate otherwise.

The official [UW Student Conduct Code](#) and an [amplification prepared](#) for UWB students generally may be of use to you. 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.*

Collaboration: Some assignments (HW's) are individual, while others may be formal collaborations with your partner.. Discussion of problems with fellow students is ok, provided you do not provide detailed outlines of solutions or give specific answers to problems. *You may look to the other students for hints and suggestions about how to approach the problem, not for solutions to it.* You may always discuss any problem with me. You are expected to subscribe to the highest standards of honesty. Failure to do this constitutes plagiarism. Plagiarism includes copying assignments in part or in total, using solutions from other students, solution sets, other textbooks, etc. without crediting these sources by name. Plagiarism will not be tolerated in this class, any more than it would be in the “real world”. Any student guilty of plagiarism will be subject to disciplinary action. In the “real world”, you are responsible for the security of your intellectual properties. In our case, you are responsible for the security of your problem solutions (either on public hard disk, or on printed copies) and copies of your homework assignments.

Work turned in for this course may be subject to electronic checking for plagiarism.

Grades.

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

Final Exam	20%
Midterm Exams	40% (20% ea)
Paper	20%
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 warranted, 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.

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 will be a major avenue for communication. In addition, I will use the class e-mail list, listserv, 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 or forward daily. 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 on-line documentation that explains how to set up an account, how to send e-mail, etc.

There is a web-based U-mail form set up that allows you to send me either identified or anonymous e-mail from the browser. It can be found at URL:

<https://catalysttools.washington.edu/umail/form/jackels/3026>

and there are links to this Umail form on the course home page.

Class Listproc

A listserver has been set up for the class. Any message or reply sent to this address is rebroadcast to the entire class. You are welcome to use this when you want to communicate with the entire class. Your UWNetID e-mail account is automatically subscribed to this listproc. The e-mail address for this is: bes311a_wi11@u.washington.edu

Note the single underscore between "bes311a" and "wi11"; it is required.

Use of Class Discussion Board

I have set up a computer discussion board for our use. This is an excellent medium for class discussions. Any class member can post to the bulletin board. It forms a "running" conversation that can be about the lectures, problem assignments, etc. I am using E-Post for this purpose. The bulletin board is found at:

<https://catalyst.uw.edu/gopost/board/jackels/19788/>

A link to this bulletin board will appear on the course web site. Your access to the board will be via UWNetID. After you login to the board, you may click on "Profile" and then click on "Notifications" to select whatever notification you may prefer.

Electronic Submission of Assignments

Most assignments for this course will be submitted partially or entirely electronically. Detailed instructions are found in the assignments and on the drop box sites:

- The Catalyst drop-box site for individual homeworks (HW's) is found at: <https://catalyst.uw.edu/collectit/dropbox/jackels/13226>
- The Catalyst drop-box for the research project deliverables is found at: <https://catalyst.uw.edu/collectit/dropbox/jackels/13227>

Course Home Page

My personal home page is found at the URL:

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

Click on the entry referring to this course and you will find yourself at the course home page:

<http://faculty.washington.edu/jackels/bes311.w11/index.htm>

Tentative Class Schedule (subject to change)

Week	DATE	READING	TOPICS
1	Jan 3	Preface. pp1-24, and Ch 1, Baird	Course introduction; Intro to atmospheric chemistry. Stratospheric ozone depletion
	Jan 5	Ch 2, Baird	Ozone Holes
2	Jan 10	Ch 3, Baird	Continuation of stratospheric ozone chemistry and intro to tropospheric Air Pollution
	Jan 12	Ch 4, Baird	Continuation of tropospheric air pollution
3	Jan 17		HOLIDAY
	Jan 19	Ch 5, Baird	Consequences of air pollution and Detailed atmospheric chemistry
4	Jan 24	Ch 6, Baird	Greenhouse Effect
	Jan 26		Midterm Exam 1
5	Jan 31	Ch 7, Baird	Fossil Fuel energy and global warming
	Feb 2		
6	Feb 7	Ch 8, Baird; parts of Ch 9	Renewable and Nuclear Energy
	Feb 9		Organic chemistry and Pesticides
7	Feb 14	Appendix, Baird	Continuation of pesticides
	Feb 16	Ch 10, Baird	Dioxins, PCB's, Furans and other toxic organics
8	Feb 21		HOLIDAY
	Feb 23	Parts of Chs 11, 12 of Baird	Midterm Exam 2
9	Feb 28	Parts of Ch 13, Baird	Chemistry of natural waters
	Mar 2	Parts of Ch 14, Baird	Pollution and Purification of water
10	Mar 7	Parts of Ch 15-16, Baird	Heavy Metals; Waste and Soils
	Mar 9		Final Presentation and While Paper due
11	Mar 14	{review}	Final Exam

Week	Date	Res Proj (Sun's)	Hwk's (Sat's)	Misc (various)
1	Jan 5			Class Survey (Wed)
	Jan 8		HW0-due	
2	Jan 15		HW1-due	
3	Jan 22		HW2-due	
4	Jan 23	ResProj 1		
5	Feb 5		HW3-due	
6	Feb 12		HW4-due	
7	Feb 13	ResProj 2		
	Feb 19		HW5-due	
8				
9	Feb 27	ResProj 3		
	Mar 5		HW6-due	
10	Mar 9			ResProj and Paper due (Wed)
	Mar 12		HW7-due	
11	Mar 14			

These assignments are to be turned in electronically before deadlines shown at the drop box sites.

Drop boxes have been set up at the course turn-in site:

<https://catalyst.uw.edu/collectit/dropbox/jackels/13226> (HWs)

<https://catalyst.uw.edu/collectit/dropbox/jackels/13227> (Projects)

Other forms of submission, such as e-mail attachments, will not be accepted.