



**Professor:** Ken Overway  
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**Homework Login Page:** [photon.bridgewater.edu](http://photon.bridgewater.edu)

**Course Description:** The chemistry and quantitative aspects of environmentally important cycles (C, N, O, P, S) in the context of the atmosphere, hydrosphere, and lithosphere. Major environmental issues will be discussed such as acid rain, sewage treatment, ozone destruction, anthropogenic climate change, air pollution, and eutrophication. Laboratories will involve sampling, quantitative detection, and data analysis.

**Course Credits:** 4 credits  
**Course Meeting:** MWF 11:00 AM – 11:50 AM in McKinney 345  
**Laboratory Meeting:** Tuesday 1:00-5:00 in MCK 326  
**Required Materials :**

- textbook –*Environmental Chemistry* by Gary vanLoon and Stephen Duffy, 3<sup>rd</sup> ed., Oxford, ISBN: 978-0-19-922886-7
- a scientific calculator of some sort capable of scientific notation, logarithms, and exponents
  - **NOTE: CELL PHONE USAGE WILL NOT BE ALLOWED DURING EXAMS, SO DO NOT DEPEND ON THE CALCULATOR FUNCTION OF YOUR CELL PHONE**
- laboratory experiments will be handed out prior to each experiment
- a bound lab notebook (just like the one required for CHEM 161&162)

**Course Objectives:** I hope your goal for the course is to begin to understand the details that surround the function and measurement of environmentally significant chemical systems.

**Course Objectives/Student Learning Outcomes:** ENVRK7: Understand the chemistry and biology behind environmental problems, ENVRK1: Understand basic chemistry.

**Office Hours:** If I am in my office and the door is open, you are welcome to come in and ask questions. Making an appointment with me via email will be your best method of getting help outside of class, but you are always welcome to stop by my office and see if I am available.

**College Honor Code:** Ethics, honor, and integrity are the fundamental principles at the core of the Bridgewater College experience. Our community can only flourish in an environment of trust and respect and these notions of personal honor, integrity, and faith are the fundamentals of the Bridgewater Honor System. The Code of Honor prohibits lying, cheating, and stealing and Bridgewater College's commitment to ethics, integrity, and values is embodied in the Code of Ethics. Violation of these Codes demonstrates harm to the community and an all-student Honor Council administers regulation of this Honor System. It is the goal of our Honor Council to assist in the development of students' ethical and moral base. 2006-2007 Academic Catalog, Bridgewater College It may be found at <http://bridgewater.edu/WritingCenter/BCplagiarism.htm>

**Notification of Student Support Services:** The Academic Support Center, located in Bicknell House, promotes learning skills and personal development through academic counseling, advising, tutoring services, disability services, and a transition program for selected new students. Further information may be found at [http://www.bridgewater.edu/departments/academic\\_support/](http://www.bridgewater.edu/departments/academic_support/)



**Letters of Recommendation:** Some time during your years at Bridgewater College you may need to obtain a letter of recommendation from me or your other professors for an employer, graduate school, medical school, etc. I am always willing to write these letters since I like to brag about my students who work and study so very hard. In all letters I try to convey the truth about students' achievements and behavior. Thus, your performance and behavior in the classroom and laboratory forms the content of these letters. If you show independence, competence, and knowledge of the class material or laboratory experiment, those details will be discussed in the letter. Accordingly, all poor behavior such as sleeping in class, texting, whining, cluelessness, and lack of initiative will also go into any letter of recommendation. Your behavior will not affect your grade in class unless it becomes disruptive to others in the class, but do not expect any requested letter of recommendation to be more praiseworthy than you deserve.

**Grading:** The grading break-down is as follows:

For the lecture portion of the course:

Item	% of Total
homework	15 %
quizzes	10 %
exams	22 %
final exam	15 %
lab	30 %
review CAPA	5 %
In The News	3 %

% Earned	Letter Grade	% Earned	Letter Grade
≥ 95.0 %	A	≥ 73.3 %	C
≥ 90.0 %	A-	≥ 70.0 %	C-
≥ 86.7 %	B+	≥ 66.7 %	D+
≥ 83.3 %	B	≥ 63.3 %	D
≥ 80.0 %	B-	≥ 60.0 %	D-
≥ 76.7 %	C+	< 60.0 %	F

For the lab portion of the course:

Item	% of Total
attendance	20 %
Pre-lab assignments	20 %
Lab notebooks	15 %
Lab reports	45 %

### COMMENTS ON THE LECTURE PORTION OF THE COURSE

**Homework:** Homework is a very important way to learn anything. Unless you practice something over and over, you will not learn it well. Students who conscientiously complete all homework assignments generally do the well in the class. Homework will assigned and completed using online Computer Assisted Personalized Approach (CAPA). Each week CAPA assignments will be distributed in the lecture room. Each assignment has a set number and a CAPA ID number.

See the "CAPA Homework Instructions" handout for more information.

**IMPORTANT:** Because the answers to each CAPA assignment will be different from person to person, you are strongly encouraged to work together on your homework. It is acceptable to work with friends to figure out the formula or answer to each question as long as each person understands the answer to the problem BEFORE it is answered. Suffice it to say that while I may not be able to tell immediately if someone has done your homework for you (this is cheating, by the way, and will not be tolerate if it is detected), I will be able to tell if you have done your own homework by your quiz and exam scores.



**Course Home Page:** There will be a course home page which you can locate from my home page located at the following URL: <http://www.bridgewater.edu/~koverway/courses/CHEM320/chem320home.htm> This web site will be the depository for my class lecture notes, practice exams, and links to extra reading material.

**Quizzes:** Quizzes are meant to prepare you for the exams. Quizzes will be timed and taken from homework problems, information from class discussions, or examples from worksheets. The questions may require numerical answers or explanations. I will drop the lowest two scores and include the remainder of the quizzes in your final grade. No make-up quizzes will be given for any reason, so one of the quizzes you miss will be the quiz that gets dropped.

**Exams:** There will be 3 exams given during the semester (see schedule for dates) and one comprehensive final at the end of the semester. Pertinent mathematical formulas and/or physical constants will be provided for you on the cover page of each exam.

**NOTE:** If you fail to show up for an exam without notifying me **in advance**, you will receive a zero for that exam unless you have documented proof that a personal or familial medical emergency occurred the evening or morning before the exam.

**Rescheduling Exams:** If you need to reschedule an exam or the final exam, you must get written notice from the Academic Dean. When I have received the written notice, I will arrange for a mutually convenient time for you to take the exam.

**Attendance:** Regular class attendance is expected of all students and attendance records are kept via missed quizzes and homework assignments that are not received in class. A student who persists in being absent from class will be reported to the Vice President and Dean for Academic Affairs. At the discretion of the instructor and the Dean, the student may be withdrawn from the course with a Withdraw Failing (WF) grade and may possibly be withdrawn from the College. Missing class too often will directly affect your grade in the course through missed quizzes, for which there are no opportunities for make-ups.

**In The News:** Each student is assigned two news stories to report to the class. See the "In The News" link on the course home page for your assignments. Your task is to do the following: 1) Before you present, click on the news story and listen to the report. 2) Find this same report online in the newspaper of a major city (New York; Lincoln, Nebraska; etc). Print the story and highlight key portions. 3) Type a document that answers the following questions:

1. What is the environmental issue at the center of the story?
2. Where does the story take place; who is involved?
3. What do you find interesting/surprising about the story?

You will summarize the news story and answer the questions during the first 10 minutes of class on the designated Friday (see the syllabus schedule).

You will turn in A) the printed copy of the highlighted copy of newspaper story, and B) the typed document containing the answers to the questions above.

## Tentative Lecture Schedule

Day	Date	Topic	Reading	Notes
Wed	1/25/2012	Introduction	take the Safety Seminar quiz	
Fri	1/27/2012	Measurement Statistics - the basics	handout	
Mon	1/30/2012	More Statistics - Hypothesis Testing	handout	
Wed	2/1/2012	More Statistics - Quantitation	handout	<b>quiz 1</b>
Fri	2/3/2012	More Statistics - Quantitation	handout	<b>In The News #1</b>
Mon	2/6/2012	review		
Wed	2/8/2012	<b>Exam I</b>	statistics material	
Fri	2/10/2012	FTIR Prelab/The Atmosphere of the Early Earth	CH1 and handout pckt	<b>In The News #2</b>
Mon	2/13/2012	The Atmosphere: layers, sunlight & reactions	2.1 - 2.3	<b>320 review set due, quiz</b>
Wed	2/15/2012	The Atmosphere: radicals, kinetics, and equilibrium	2.3	
Fri	2/17/2012	The Atmosphere: smog and HC oxidation	4.1-4.2	<b>In The News #3</b>
Mon	2/20/2012	The Atmosphere: engine types and exhaust	4.3	<b>quiz 3</b>
Wed	2/22/2012	The Atmosphere: acid rain/precipitation	CH5 - all sections	
Fri	2/24/2012	The Lithosphere: soil properties, buffers	CH 17	<b>In The News #4</b>
Mon	2/27/2012	Lab CAPA set for Soils Lab (set #5)		
Wed	2/29/2012	The Lithosphere: soil buffers, metals	18.4	<b>quiz 4</b>
Fri	3/2/2012	The Atmosphere: stratospheric chemistry	3.1 - 3.3, 3.6	<b>In The News #5</b>
Mon	3/5/2012	<b>Spring Break - no scheduled class</b>		
Wed	3/7/2012	<b>Spring Break - no scheduled class</b>		
Fri	3/9/2012	<b>Spring Break - no scheduled class</b>		
Mon	3/12/2012	The Atmosphere: CFC's and replacements	3.4-3.5	
Wed	3/14/2012	The Atmosphere: climate change	8.1-8.3	
Fri	3/16/2012	The Atmosphere: climate change	8.4-8.6	<b>In The News #6</b>
Mon	3/19/2012	The Atmosphere: climate change		<b>quiz 5</b>
Wed	3/21/2012	review		
Fri	3/23/2012	<b>Exam II</b>	CH 1-4, 8, 17, 18.4	
Mon	3/26/2012	The Hydrosphere: concentration units	CH 9	
Wed	3/28/2012	The Hydrosphere: dissolved gases, equilibria	11.1-11.2	<b>quiz 6</b>
Fri	3/30/2012	The Hydrosphere: organic matter	CH 12	<b>In The News #7</b>
Mon	4/2/2012	The Hydrosphere: metals	CH 13	
Wed	4/4/2012	The Hydrosphere: phosphorus cycle	section 14.3	
Thu	4/5/2012	<b>Last day to withdraw</b>		
Fri	4/6/2012	<b>Easter Break - no scheduled class</b>	15.1-15.2	<b>In The News #8</b>
Mon	4/9/2012	<b>Easter Break - no scheduled class</b>	15.2	
Wed	4/11/2012	The Hydrosphere: microbial processes	15.3	
Fri	4/13/2012	The Hydrosphere: BOD/COD	15.4	<b>In The News #9</b>
Mon	4/16/2012	The Hydrosphere: nitrogen cycle		<b>quiz 8</b>
Wed	4/18/2012	The Hydrosphere: sulfur cycle	CH 9, 11-15	
Fri	4/20/2012	review		
Mon	4/23/2012	<b>Exam III</b>		
Wed	4/25/2012	The Hydrosphere: sewage treatment	CH 16	
Fri	4/27/2012	The Hydrosphere: sewage treatment	CH 16	<b>In The News #10</b>
Mon	4/30/2012	The Hydrosphere: sewage treatment (video)		
Wed	5/2/2012	review		<b>quiz 9</b>
<b>Final Exam Schedule</b>				
Fri	5/4/2012	10:30 a.m. - 12:30 p.m. in MCK 345		

*Note: This schedule will be adjusted throughout the course to provide for maximum student learning and contextual changes within the community of learners.*

**COMMENTS ON THE LABORATORY PORTION OF THE COURSE**

**Attendance:** Attendance is mandatory in the laboratory portion of the course. You will not pass this course unless you complete every laboratory. If you have a valid conflict with a scheduled laboratory, it is your responsibility to notify me at least 1 week in advance so that I may arrange for a period when you can make-up the absence. If you do not show up for a lab without making prior arrangements, you will automatically lose 10% of the points allotted to the lab report for the experiment you missed - **WITHOUT EXCEPTION! If this happens a second time or more, you will get a zero for the lab.** It is rude and thoughtless for you to leave your partner to fend for herself/himself and I will consider this behavior to be indicative of your performance in the course.

**Pre-lab Assignments:** Pre-lab assignments will be printed in each laboratory handout or given to you as a CAPA set. All written portion of the homework are to be completed and turned in **at the beginning** of each lab. You are to answer the questions thoroughly and completely. When a numerical answer is required, you must provide a derivation or example calculation (whichever is appropriate) to get full credit. Pre-lab assignments will be accepted late only if it is determined that the assignment was completed before the beginning of lab.

**Lab Reports:** See your lab manual for a description of the format of the lab reports.

**Due Date:** All lab reports will be due one week after the completion of the experiment (unless otherwise stated by the instructor). Late lab reports will be penalized 10% per day it is late. After 10 days, don't even bother turning in the lab report. Each student gets one late lab penalty waiver (for reports late less than 1 week).

**Lab Notebooks:** You can use any lab notebook for this course as long as it is not a spiral-bound notebook and the pages are not easily removed.

You must have your lab notebook with you when you are in the laboratory. You will not be permitted to start any lab experiment without your notebook.

**Dress Code:** Due to the hazardous nature of the chemicals and equipment used in the laboratory, a safe dress code will be enforced. Absolutely no open-toed shoes, shorts, or skirts will be permitted in the laboratory and safety glass will be worn at all times while you are in the laboratory. You are strongly encouraged to wear a lab coat.

**Disabled Students:** If you require any special equipment or consideration due to a learning or physical disability, please let the instructor know at your discretion so the proper arrangements can be made

## Tentative Lab Schedule

Day	Date	Experiment	Notes
Tue	1/31/2012	Spreadsheet Lab/CAPA regression set for next week	work on regression spreadsheet
Tue	2/7/2012	Calibration Curves	email Cal Curve spreadsheet, submit data
Tue	2/14/2012	FTIR Analysis of Automobile Exhaust	you will write a full report for this exp.; draft + final
Tue	2/21/2012	FTIR data processing	FTIR draft report due
Tue	2/28/2012	Soils, Metals, and Acid Rain - prepare samples	FTIR final report due
<b>Tue</b>	<b>3/6/2012</b>	<b>Spring break - no lab</b>	
Tue	3/13/2012	Soils, Metals, and Acid Rain - analyze samples	
Tue	3/20/2012	Soils, Metals, and Acid Rain - data processing	
Tue	3/27/2012	Water Quality lab - week 1: reagent and standard prep	email Soils spreadsheet; turn in post-lab Q's from Soils
Tue	4/3/2012	Water Quality lab - week 2: standard analysis	
Tue	4/10/2012	Water Quality lab - week 3: in the field	
Tue	4/17/2012	Water Quality lab - data processing	
Tue	4/24/2012	Tour of a sewage treatment plant	full Water Quality report due

*Note: This schedule will be adjusted throughout the course to provide for maximum student learning and contextual changes within the community of learners.*