

**Environmental Chemistry  
Chem331**

**University of Mary Washington  
Fall 2010**

**Lecture:** MWF (12:00 - 12:50) (Jepson 313)

**Instructor:** Dr. Charles Sharpless, Jepson 340; Phone: 654-1405; Email: [csharp@umw.edu](mailto:csharp@umw.edu)

**Office Hours** Walk-in: M (10-12), W (10-11, 1-2), F (10-11), Appointments are also welcome!

**Text:** Principles of Environmental Chemistry, 1<sup>st</sup> Ed., JE Girard, (Jones and Bartlett, Pub.)

**Course Website:** <http://blackboard.umw.edu/>

**Course Description and Objectives:** This course is designed as an introduction to chemical processes in earth's environment for students in chemistry and the environmental sciences. We will use basic chemical principles to understand the chemistry of the atmosphere, surface waters, and, to some extent, soil. A major focus of the course will be on how natural systems are influenced by human actions, such as energy production, agriculture, and industry. We will also spend time examining simple equilibrium approaches to predicting the environmental fate of persistent organic chemicals. Through this course, you will gain (1) a qualitative and quantitative understanding of the major chemical processes controlling the flow of materials and energy throughout the environment, (2) an appreciation of the ways that natural chemical systems are altered by anthropogenic influences, and (3) a familiarity with modern problems relating to the sources and fate of chemicals known to be environmental contaminants.

**Prerequisites:** To succeed in this course, you must have completed college-level general chemistry. In Chem331, we will encounter topics from physical, organic, and analytical chemistry, but you need not have previously taken these courses. Some assignments will require you to perform spreadsheet calculations and graphing using programs such as Microsoft Excel, and prior experience with this, although not necessary, will prove useful.

<b>Grading:</b>	Practice Problem Sets	15%
	Contribution to Special Topic	15%
	In-Class Exams (best 2 of 3)	50%
	Cumulative Final Exam	20%

*Students with a grade of C or below on 10/14 will receive a mid-semester deficiency report.*

**Practice Problem Sets:** There will be seven practice problem sets assigned throughout the semester. These are not graded per se, but thorough completion and submission of them will count towards 15% of your grade. The problem sets are representative of the types of problems you may encounter on exams or in real-life situations where you are asked to assess environmental chemistry data. To be able to pass the exams, it is essential that you do these problem sets. Answer keys will be available on the dates that they are due.

**Exams:** There will be three closed-book exams (50 minute). Your best two exam grades will count towards your course grade. Review sheets will be posted on Blackboard. The dates of the exams are given in the weekly schedule below. Any necessary equations and constants will be provided. Missed exams may not be made-up. Should you know or suspect in advance that you will miss an exam, you must contact me to make appropriate arrangements.

**Special Topic:** During the last two weeks of class, we will cover a topic in environmental chemistry based on current research literature. You will work in groups, and each group will be asked to select three possible papers and to rank them in order of importance. These rankings, and the papers, will be made available to the whole class. Rankings must be accompanied with a brief essay making a sound argument for each paper's importance to the field. We will use both a Blackboard discussion board and class time to debate the merits of each group's papers with the goal of narrowing our selection to two or three papers to be considered in detail. Your grade will consist of three parts: 30% will be my assessment of the intellectual quality of your group's logic for paper selection; 30% will be the same assessment but performed by the other groups; the remaining 40% will be an anonymous peer evaluation by your group members of the quality of your contribution to the selection and defense of the papers.

**Assigned Readings:** Most readings will come from the required text by James E. Girard, abbreviated below as JEG. Other readings will be assigned for the special topic and will be posted on Blackboard. The lectures do not follow the readings exactly, and you should do the reading before coming to lecture so that you are prepared to engage meaningfully in class and address questions you may have about differences between the text's approach and mine.

**Attendance:** In order to succeed in Chem331, you must attend lecture, because lecture time will be used to thoroughly examine topics that are summarily covered in assigned readings. Absences will thus detrimentally affect your understanding of the material. Absences due to illness are understandable, but should you know in advance that you will be absent, I would appreciate an email informing me. Regardless of the reason, you should obtain lecture notes from a fellow student or me and check with me to make sure you understand the notes.

**Field Trips:** There will be one field trip this semester, which hopefully everyone can attend. The trip is not required, although I encourage you to attend since I think you will find them interesting and educational. Scheduling will be worked out in class as the semester proceeds.

**Honor System:** In accordance with the University's Honor Code, all work submitted for grading must be your own and be pledged as such by writing at the end of the work,

*I hereby declare upon my word of honor that I have neither given nor received any unauthorized help on this work. (your signature).*

It is both your duty as students and mine as faculty to uphold the Honor Code, which is described in detail in the student handbook (online). Any suspected violations of the Honor Code will be addressed according to the policy established by the Honor Council.

**Accommodations for Students with Disabilities:** Students requiring accommodations due to a disability should visit the Office of Disability Services online (<http://www.umw.edu/disability/>) for information about available resources. You will need to request appropriate accommodations through ODS as soon as possible and then make an appointment to see me to verify your approved accommodation as specified in the letter issued you by ODS.

**Miscellaneous Important Stuff:** Please turn off cell phones in class. Cell phones are prohibited from examinations, as are PDA's and laptops. Please do not distract yourself and others by browsing the web during class time, either on a laptop or a PDA.

### Chem331 Weekly Course Schedule (Fall 2010)

Week Of	Topic	Readings*
Aug. 23 <sup>rd</sup>	Introduction to environmental chemistry Energy use and fossil fuels	JEG pp. 3-21 JEG Ch. 10
Aug. 30 <sup>th</sup>	Energy use and fossil fuels	JEG Ch. 10
Sep. 6 <sup>th</sup>	Introduction to atmospheric chemistry CO <sub>2</sub> and global warming <i>Friday, 9/10: drop period ends</i>	JEG Ch. 3
Sep. 13 <sup>th</sup>	Energy use and tropospheric chemistry	JEG Ch. 4
Sep. 20 <sup>th</sup>	Alternative energy sources <i>Exam 1: Wed., Sept. 22<sup>nd</sup> (Chaps. 1, 3, 10)</i>	JEG pp. 332-343 JEG pp. 349-355 and 360-372
Sep. 27 <sup>th</sup>	Alternative energy sources Acid rain, effects on soil <i>Friday, 10/1: last day to declare P/F</i>	JEG pp. 332-343 JEG pp. 349-355 and 360-372 JEG pp. 47-56 and 216-220
Oct. 4 <sup>th</sup>	Principles of water chemistry	JEG pp. 201-221 and 21-29
Oct. 11 <sup>th</sup>	<i>No class on 10/12 (Fall Break)</i> Alkalinity and acid rain	JEG pp. 201-221 and 21-29
Oct. 18 <sup>th</sup>	Alkalinity and acid rain Water pollution and treatment <i>Exam 2: Fri., Oct. 22<sup>nd</sup> (Exam 1 through Ch. 7)</i> <i>Friday, 10/22: last day to withdraw from courses</i>	JEG pp. 201-221 and 21-29 JEG Ch. 8 and 29-32
Oct. 25 <sup>th</sup>	Water pollution and treatment	JEG Ch. 8 and 29-32
Nov. 1 <sup>st</sup>	Persistent organic pollutants (POPs)	JEG Ch. 15 (pp. 441-459)
Nov. 8 <sup>th</sup>	Fate of POPs	JEG Ch. 15 (pp. 441-459)
Nov. 15 <sup>th</sup>	Special topic <i>Exam 3: Fri., Nov. 19<sup>th</sup> (Exam 2 through Ch. 15)</i>	TBA
Nov. 22 <sup>nd</sup>	Special topic <i>No class Wed. or Fri. (Thanksgiving)</i>	TBA
Nov. 29 <sup>th</sup>	Special topic	TBA
Dec. 6 <sup>th</sup>	<i>Final Exam, Friday, Dec. 10<sup>th</sup>, 12-2:30 PM, Jepson 313</i>	