“Education in and about chemistry is critical in addressing challenges such as global climate change, in providing sustainable sources of clean water, food and energy and in maintaining a wholesome environment for the well being of all people…” –UN International Year of Chemistry resolution

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Pre-requisites: CHEM 220 and 220L

Scientific calculator with logarithmic and exponential functions

Student Learning Outcomes:
- To deepen understanding of the chemical processes that influence the environment (air, water, soil and climate).
- To apply fundamental chemical principles (specifically acid-base chemistry, thermodynamics, kinetics, redox reactions and light-matter interactions) to understand the sources, transport, transformation and ultimate fate of various chemical species in the environment.
- This course will be divided into three main units that reflect the most pressing issues in modern environmental chemistry. We will cover:
  - Atmospheric Chemistry and Air Pollution
  - Climate Change and Energy
  - Water Chemistry, Pollution and Treatment

Attendance/Participation: You are expected to attend all classes. If you must miss a class due to an illness or school sanctioned event, it is your responsibility to get the material you missed from another student. Regular participation by all students in this small class is expected.

Homework: Homework assignments will be in the form of problem sets that will be assigned regularly and posted on OAKS. Assignments are due at the start of class on their due date. **Late homework will not be accepted.** The assigned problems will give you the minimum practice that you will need to successfully complete this course. It is imperative that you complete all assigned problems. Additional problems are available in your textbook.

Quizzes: Three quizzes will be given in class at the approximate mid-point between exams. Quiz dates and material covered will be announced in class.

Tests: There will be three in-class tests (see schedule below). If you know in advance you will miss a test due to a religious observance or school sanctioned event, it is your responsibility to let me know immediately so arrangements can be made. If you miss a test unexpectedly, you must provide documentation in the form of an absence memo if you expect to make it up.

Final Exam: The final exam is cumulative and will cover lecture material from the entire semester. The final exam will be **Monday, April 25, 12:00 – 3:00 pm.**
**Sustainability Project:** Each student will be required to do an individual project focused on a topic in environmental chemistry that is of interest. This may be a more detailed examination of a subject covered in class, or it may be a new topic all together. However, the student must focus on a current, chemically based solution to an environmental problem. Potential topics may include alternative energy sources, carbon sequestration methods, nuclear waste storage or water desalination methods. The topic must be submitted to the instructor no later than **Monday, March 21** to ensure it is appropriate and everyone has a different topic. Details will follow, but the project will include both a paper and a final eight-minute presentation (**Friday, April 8**).

**OAKS:** OAKS will be used for announcements, homework assignments, supplementary materials and handouts used in class.

**Office hours:** My regularly scheduled office hours listed on the right are “open door” times when I will be in my office if you have a question or need help. If you are unable to make it to the listed office hours, email me with some suggested times and we can set up a meeting that works with our schedules.

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<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tr>
<td>10 am</td>
<td>12 pm – 1 pm</td>
<td>3 pm – 4 pm</td>
<td>11 am – 12 pm</td>
<td>1 pm – 2 pm</td>
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**Disability Services:** If you are a student with a documented disability who will require accommodations in this course, please provide the proper documentation in the form of a Professor Notification Letter (PNL). Please come to speak with me during office hours about how we may best accommodate you in this course.

**Academic Dishonesty:** Lying, cheating, attempted cheating, and plagiarism are violations of the Honor Code of the College of Charleston (http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php). As it pertains to this course, examples of academic dishonesty would include copying another student’s work during a quiz or exam or accessing information with a cell phone or computer during a quiz or exam. Working together on homework is not considered academic dishonesty in this course, but students should use their best judgment to ensure collaborations are mutual so both/all students benefit from homework as a learning tool.

**Classroom Conduct:** It is expected you will behave as professional adults in this class. Please do not be disruptive by talking while the professor is lecturing or another student is speaking. Do not be late for class. Do not get up to take breaks – only leave during class when absolutely necessary.

**Electronic Device Policy:** Using electronic devices for activities not related to class (e.g., texting) during lecture is rude to your instructor and a distraction to your classmates. If you choose to use a laptop or tablet device during class, you should refrain from any social networking, games, etc. that are distracting to others. If your device becomes a distraction, you may be asked to put it away or move to the back of the classroom.
### Grading:

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<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Three in-class tests</td>
<td>45%</td>
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<tr>
<td>Quiz average</td>
<td>10%</td>
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<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Sustainability Project</td>
<td>10%</td>
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<tr>
<td>Attendance/Participation</td>
<td>5%</td>
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<td>Final Exam</td>
<td>20%</td>
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<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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### Grade Range and What Each Grade Means

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>What Each Grade Means</th>
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<tbody>
<tr>
<td>A</td>
<td>93.0 - 100</td>
<td>The student has achieved mastery of the material. Not only does the student demonstrate understanding of all aspects of the material to significant depth, but can reliably apply that understanding toward solving problems, both familiar and unfamiliar. What sets this student apart from others is the ability to solve problems that require synthesis of various ideas.</td>
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<tr>
<td>A-</td>
<td>90.0 – 92.9</td>
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<tr>
<td>B+</td>
<td>87.0 – 89.9</td>
<td>The student is very competent with the material. The student demonstrates understanding of most aspects of the material, but some gaps exist. He or she can routinely apply that understanding toward solving familiar problems, but will struggle slightly when solving unfamiliar problems. The student especially struggles to solve problems that require synthesis of various ideas.</td>
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<tr>
<td>B</td>
<td>83.0 – 86.9</td>
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<tr>
<td>B-</td>
<td>80.0 – 82.9</td>
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<tr>
<td>C+</td>
<td>77.0 – 79.9</td>
<td>The student is moderately competent with the majority of the material, but does not understand it to great depth. Thus, the student can solve routine problems that he or she has seen before, but definitely struggles to solve unfamiliar problems, especially ones that require synthesis of various ideas.</td>
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<td>C</td>
<td>73.0 – 76.9</td>
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<tr>
<td>C-</td>
<td>70.0 – 72.9</td>
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<tr>
<td>D+</td>
<td>67.0 – 69.9</td>
<td>The student does not demonstrate significant command of the material, essentially because he or she does not understand it. He or she struggles to solve most problems, even familiar ones. Such a student relies primarily on rote memorization, and therefore is not able to solve problems that require synthesis of ideas.</td>
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<tr>
<td>D</td>
<td>63.0 – 66.9</td>
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<tr>
<td>D-</td>
<td>60.0 – 62.9</td>
<td></td>
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<tr>
<td>F</td>
<td>&lt; 59.9</td>
<td>The student shows essentially no command of the material and is unable to solve problems that are deemed straightforward. Such students rely essentially entirely on rote memorization, and therefore are not able to solve problems that require synthesis of ideas.</td>
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Lecture Schedule
Class time will be largely devoted to lectures on new material with some class time devoted to
discussions and working problems in small groups. Students are encouraged to ask questions
throughout the class period. If significant review of material from general chemistry is needed,
students will be encouraged to review this material outside of class.

The following outline summarizes the general scope and pace of the course. Please note that exam
dates and the exact chapters covered by each exam are subject to change. Any significant changes to
the schedule below will be announced in class.

Lecture Outline:
(numbers in parentheses correspond to the anticipated number of class days for each chapter)

Unit I: Atmospheric Chemistry and Air Pollution
Chapter 1 Stratospheric Chemistry: The Ozone Layer (4)
Chapter 2 The Ozone Holes (2)
Chapter 3 The Chemistry of Ground-Level Air Pollution (5)
Chapter 4 The Environmental and Health Consequences of Polluted Air (1)
Test I Wednesday, February 10

Unit II: Energy and Climate Change
Chapter 5 The Greenhouse Effect (4)
Chapter 6 Energy Use, Fossil Fuels, CO₂ Emissions, and Global Climate Change (3)
Chapter 7 Biofuels and Other Alternative Fuels (2)
Chapter 8 Renewable Energy Technologies (1)
Chapter 9 Nuclear Energy (2)
Test II Friday, March 18

Unit III: Water Chemistry and Water Pollution
Chapter 10 The Chemistry of Natural Waters (5)
Chapter 11 The Pollution and Purification of Water (4)
Chapter 12 Toxic Heavy Metals (3)
Test III Monday, April 18

Final Exam Monday, April 25, 12:00 - 3:00 pm

Other Important Dates: Wednesday, January 13 – Last day to drop/add
Friday, March 18 – Last day to withdrawal with a grade of “W”
Monday, March 21 – Sustainability Project topic due to instructor
Friday, April 8 – Sustainability Project presentations and papers due