

Point Loma Nazarene University  
Department of Chemistry

**CHE4070 – Environmental Chemistry  
Spring Term, 2024**

MWF, 12:15 – 1:20 pm in RLC 106  
Lab: Wednesday, 2:45 – 5:45 pm, Sator 216

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Office hours: M, 1:30 – 2:30 pm; Wednesday, 1:30 – 2:30 pm; or by appointment.

*Prerequisite*

Successful completion of Analytical Chemistry (CHE2013) and Organic Chemistry I (CHE2094 and CHE2096L) are required.

**Course Description**

This 3-unit course covers the chemistry of Earth's environment, including the natural chemical processes as well as anthropogenic contributions. The environment in this context is divided into the atmosphere, the hydrosphere, the lithosphere, and anthrosphere. Particular emphasis is given to human influences in each of these "spheres," including the causes, effects, detection, prevention, and mitigation of pollution. Environmental pollution is a global problem, with many technological and cultural causes, and as such requires an understanding of numerous disciplines in order to solve. This course thus involves the integration of concepts from chemistry, biology, geology, ecology, atmospheric sciences, hydrology, toxicology, political science, and others.

**Course Learning Outcomes**

At the completion of this course, students will be able to:

- Apply knowledge from the course to environmental problems and solutions
- Discuss contemporary environmental science issues and the impact of environmental science in global and societal contexts
- Demonstrate knowledge of concepts and assumptions related to the processes impacting the fate of pollutants in the major environmental compartments at the Earth's surface (atmosphere, hydrosphere, geosphere)
- Synthesize and evaluate scientific information about the life cycle of environmental pollutants.

**Required Textbook:** *Environmental Chemistry*, Baird & Cann, 5<sup>th</sup> edition, Freeman, 2012. ISBN: 978-1-4292-7704-4

**Recommended Textbook:** *Quantitative Chemical Analysis*, Harris & Lucy, 10<sup>th</sup> edition. This was the textbook you used in the Analytical Chemistry course.

**Lecture Materials:** Lecture materials and other useful information will be available on Canvas.

**Grading:** The final grade will be determined as follows:

- Prelecture Questions, 10%
- Problem Sets, 10%
- Presentation, 20%
- Participation, 10%
- Midterm Exams, 30%
- Final Exam, 20%.

Letter grades will be assigned according to the following scale: A, 90 – 100%; B, 80 – 90%; C, 70 – 80%, D, 60 – 70%, F, below 60%.

**Prelecture reading quizzes:** A prelecture reading quiz will be available in canvas for each lecture class. The assignment will describe the reading to be completed before the next lecture and ask a few simple questions.

**Problem Sets:** Each chapter will have a problem set due two days after the last lecture of that material.

**Presentation:** Each student will deliver a 15–20 minute presentation discussing an environmental pollutant. You will need to summarize the courses, transport, and fates (including chemical reactions) of a single pollutant released into the environment. You will also need to find a published scientific research study that examines an environmental aspect of this pollutant and discuss the findings.

**Participation:** Various in-class activities will be graded during the semester. These could include discussions, worksheets, etc.

**Exams:** There will be three midterm exams during the semester and a final exam. The date of the midterm exams will depend on the pace of the class and at least one week notice will be given. The final exam will be on Monday, April 29<sup>th</sup>.

**Topics and associated reading (best estimate of course progress)**

Week	Dates	Topic (book chapter)
1	1/8 – 1/12	<b>Course Introduction &amp; Stratospheric Chemistry (Ch. 1)</b>
2	1/15 – 1/19	<b>Stratospheric Chemistry (Ch. 1) and Ozone Holes (Ch. 2)</b> January 15 MLK holiday
3	1/22 – 1/26	<b>Ozone Holes (Ch. 2) &amp; the Chemistry of Ground-Level Air Pollution (Ch. 3)</b>
4	1/29 – 2/2	<b>Ground-Level Air Pollution (Ch. 3) &amp; Advanced Atmospheric Chemistry (Ch. 17)</b>
5	2/5 – 2/9	<b>Advanced Atmospheric Chemistry (Ch. 17) &amp; Consequences of Polluted Air (Ch. 4)</b>
6	2/12 – 2/16	<b>Consequences of Polluted Air (Ch. 4)</b> <b>Exam 1 (Chapters 1 – 4 &amp; 17)</b> <b>The Greenhouse Effect (Ch. 5)</b>
7	2/29 -2/23	<b>The Greenhouse Effect (Ch. 5)</b>
8	2/26 – 3/1	<b>Energy and Climate Change (Ch. 6)</b>
<b>9</b>	<b>Spring Break 3/4 – 3/8</b>	
10	3/11 – 3/15	<b>Alternative Fuels (Ch. 7) &amp; Renewable Energy (Ch. 8)</b>
11	3/18 – 3/22	<b>Renewable Energy (Ch. 8) &amp; Nuclear Energy (Ch. 9)</b>
12	3/25 – 3/29	<b>Exam 2 (Chapters 5 – 9)</b> <b>Chemistry of Natural Waters (Ch. 10)</b>
	<b>Easter Break 3/28 – 4/6</b>	
13	4/1 – 4/5	<b>Natural Waters (Ch. 10) &amp; Water Pollution (Ch. 11)</b>
14	4/8 – 4/12	<b>Water Pollution (Ch. 11) &amp; Toxic Heavy Metals (Ch. 12)</b>
15	4/15 – 4/19	<b>Toxic Organic Compounds (Ch. 13 – 15)</b>
16	4/22 – 4/26	<b>Toxic Organic Compounds (Ch. 13 – 15)</b> <b>Exam 3</b>
	<b>Final Exam</b>	<b>Monday, April 29, 10:30 am – 1:00 pm</b>

**PLNU Mission**  
**To Teach ~ To Shape ~ To Send**

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

**PLNU FINAL EXAMINATION POLICY.** Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the [Traditional Undergraduate Records: Final Exam Schedules](#) site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

**PLNU COPYRIGHT POLICY.** Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

**STATE AUTHORIZATION.** State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

**INCOMPLETES AND LATE ASSIGNMENTS.** All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

**PLNU ACADEMIC HONESTY POLICY.** Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

**SPIRITUAL CARE.** Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#)

**PLNU ACADEMIC ACCOMMODATIONS POLICY.** PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center ([EAC@pointloma.edu](mailto:EAC@pointloma.edu) or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

**PLNU ATTENDANCE AND PARTICIPATION POLICY.** Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an "F" grade.