SDSU | San Diego State University

CHEM 571: TOPICS IN ENVIRONMENTAL CHEMISTRY

DATES: SECOND SUMMER SESSION 2025 (JULY 8TH THROUGH AUGUST 15TH)

COURSE INFORMATION

Instructor: Professor John Love
Department: Chemistry and Biochemistry
Email: jlove@sdsu.edu
Class Days and Times: This class is a fully Online course and therefore there are no class meeting days.
Office Hours: There are two hours in which I will have scheduled office hours that will be managed through the Zoom link below. The two days for offices hours are Tuesdays 9:00 am until 10:00 am and Wednesdays from 4:00 until 5:00 pm at the Zoom link below.
Office hours are **NOT** mandatory.

Office Hours Location: Zoom Meeting
https://SDSU.zoom.us/j/5536485681
Meeting ID: 553 648 5681

Course attendance Policy: Students are expected to fully review **ALL** online lectures. The links for all of the online lectures are accessible through the Canvas webpage for this course.

Syllabus is Subject to Change: This syllabus and schedule are subject to change in the event of extenuating circumstances. It is your responsibility to check for new Canvas announcements.

About Your Instructor: Dr. Love is a Professor in the Chemistry and Biochemistry Department at SDSU. He is also the Director/Advisor for the Environmental Science major. Dr. Love runs a full-time research laboratory in which undergraduate, MS, and PhD students pursue projects in the field of Protein Design. We are currently working on a project in which we are designing proteins to bind and purify Rare Earth Elements (REE). One REE in particular, which is critical for the electrification of transportation, is neodymium due to its exceptionally strong magnetic properties. On a per weight basis, neodymium-based alloys are used to engineer stronger magnets than iron-based magnets and therefore it is needed to produce the highly efficient electric engines essential for the modernization of transportation. Another environmental based project in my laboratory (which will be discussed in this class) is the development of alternative sources of protein for human consumption. Existing examples of such include the 'Impossible Burger', 'Beyond Burger', and the company BlueNalu which produces alternative protein in cell-cultured seafood. Dr. Love and his undergraduate and graduate research students are working to develop bacterial fermentation methods to produce cheese that is independent of dairy (cow-

less cheese). The goal is to produce nutritious protein using methods that greatly reduce ecological damage and other issues associated with the industrial livestock industry.

COURSE DESCRIPTION

Environmental chemistry is the study of the local, regional, and global distribution of different chemicals and biochemical molecules within the environment. We will study the interactions of matter (chemicals) in the environment, both outdoors as well as within work and living spaces. This is a chemistry course, and therefore this course will help you think critically about complex environmental issues by applying key chemical knowledge and analytical skills in a scientific manner. There are currently many environmental problems and issues occurring on our planet. This course will emphasize how the specific discipline of chemistry will enable us to understand environmental issues and also illustrate how scientists can work to alleviate the environmental problems the world is currently facing. During this course we will study the chemistry of air, water, land, minerals, and toxic chemicals as well as how human activities contribute to the different distributions of these elements. In doing so we will also examine the sources, reactions, transport, effects, and fates of chemical species found in air and water and how technology contributes both positively and negatively to these processes. This course covers many of the pressing issues in our environment today. Topics to be covered include the ever-expanding human population, atmospheric chemistry and air pollution, climate change and energy production and use, water chemistry and water pollution, and various toxic compounds. All students who take this course are expected to demonstrate a mastery of these topics through in class discussions and six online Canvas exams.

From the SDSU Catalog: Fundamentals of chemistry applied to environmental problems. Chemistry of ecosystems; analysis of natural constituents and pollutants; sampling methods; transport of contaminants; regulations and public policy. Maximum credit three units.

COURSE LEARNING OBJECTIVES

Following this course, students will be able to:

1. Demonstrate an understanding of atmospheric chemistry and air pollution.
2. Describe the make-up of matter in terms of its elemental and molecular composition.
3. Describe the greenhouse effect, climate change; and distinguish between fossil fuels and renewable energy technologies.
4. Use chemical bonding models and molecular composition to recognize potential environmental impacts of substances (*e.g.,* water solubility, acidity).
5. Analyze environmental scientific data using the scientific method to apply the effects of environmental chemistry on the ecosystems.
6. Explain basic concepts of water chemistry and water pollution.
7. Describe how some chemical techniques are used to quantify the distribution and concentration of substances and use this kind of data as part of an evaluation of environmental impacts.
8. Demonstrate the ability to use ethical reasoning to articulate a position on important environmental issues.

Enrollment Information

Prerequisite

General Chemistry: The only pre-requisite course that is required for this course (CHEM 571) is General Chemistry - CHEM200. Courses from other universities/colleges that are equivalent to the SDSU CHEM200 also function as an acceptable prerequisite course.

Course Materials

Required Materials

- There is no required textbook. PDF files that contain notes/PowerPoint slides for all lectures are provided on the Canvas webpage for this course.
- All classes are taught fully online.
- Students will also be provided with PDF files of newspaper, magazine, and scientific journal articles on the Canvas webpage for this course.

Recommended or Optional Materials

- Although it is not required, the following textbook is a great reference for Environmental Chemistry: Environmental Chemistry by Stanley Manahan, 10th Edition, CRC Press, ISBN 9781498776936 - CAT# K29755.

Course Structure

This course is being offered in an online format with all recorded lessons available on the Canvas webpage for this course. All recorded course information and content is housed in the Canvas (canvas.sdsu.edu) learning Management System (LMS).

Course Requirements:

- Course Lecture Policy: Students are expected to completely access and learn from **all** online lectures. Grades are based on the following:
  1. Students are required to watch and review all assigned video lessons. Within those lessons there are multiple-choice questions in the Play Posit format. At the end of the semester, all the points associated with the multiple-choice questions will be scaled such that they make up 30% of the final grade. While answering the questions, students are not permitted to consult with any other people, students, Google, or AI, or any source other than the recorded lessons or the associated PDF files. Students are permitted to use the recorded lessons and the PDF files in answering multiple-choice questions as well as exam questions.

2. There will be Canvas-based exams for each of the major topics (approximately 14) covered in this course. While answering exam questions, students are permitted to use the recorded lessons as well as the supplied PDF files associated with each lesson. While answering exam questions, students are NOT permitted to consult with any other people, students, Google, or AI, or any source other than the recorded lessons or the associated PDF files. At the end of the semester all exam scores will be scaled to camp for 70% of the final grade. Exams that students fail to take will be assigned a grade of zero.

Course Assessments and Scoring

Grade Scale

A	Excellent = 95-100%	A-	Above Average = 90-95%
B	Above Average to Average = 80-89%		
C	Average= 70-79%	D	Marginal = 60-69%
F	Unsatisfactory = 59% or below	I	Incomplete = Did not complete

Assignments and Weights

TABLE 1 –CATEGORY, ASSIGNMENT AND PERCENTAGE OF FINAL SCORE

Category	*Assignment*	*Percentage of Final Score*
Multiple-choice Play Posit questions.	All video lessons have multiple-choice questions embedded in them using the Canvas-based Play Posit format.	30%
Exams	Approximately 14 Canvas-based exams covering the major course topics.	70%
	TOTAL	100%

Assignment Details

30% of the final grade is derived from multiple-choice questions embedded in the video lessons using the program Play Posit. 70% of the final grade is derived from approximately 14 Canvas-based exams. For the exams, students are **ONLY** permitted to use the recorded video lessons and associated PDF note files. The Canvas-based exams will consist of between 25 and 40 multiple-choice questions that you will access via the Canvas Assignments page on the class website. All questions will be derived from class material that was covered in the recorded video lessons.

Late Exam Completion Policy

Exams are considered late if they are submitted after the due date and time as shown on the course schedule. Late exams are accepted within 24 hours of the due date and time with a 25% deduction in points.

Overall Course Outline

Chemistry, Processes, Pollutions, and other Environmental Concepts that will be covered in this course include the following:

Week 1 Recorded Videos and Exams:

- How This Course Works – due July 9th
- Introduction to course material (Part 1, Part 2, Part 3) – due July 13th
- Scientific Method – due July 13th
- Thomas Hartman article, Burning (Combusting) Ancient Sunlight – due July 13th

Week 2 Recorded Videos and Exams:

- Engineered Food chain (Part 1, Part 2, Part 3, Part 4, Part 5) – due July 17th
- Human Population (Part 1, Part 2, Part 3) – due July 20th
- Alternative Proteins - due July 23rd

Week 3 Recorded Videos and Exams:

- Layers of the Atmosphere – due July 25th
- Climate Change (Part 1, Part 2, Part 3) – due July 27th

Week 4 Recorded Videos and Exams:

- Global Ocean and Atmospheric Currents (Part 1, Part 2) – due July 29th
- Hydrosphere (Part 1, Part 2, Part 3) – due August 1st

Week 5 Recorded Videos and Exams:

- Carbon Cycle (Part 1, Part 2, Part 3, Part 4) – due August 4th
- Ozone, and the Ozone Hole (Part 1, Part 2) – due August 7th
- "Ozone Hole: How We Saved the Planet", (Part 1, Part 2, Part 3, Part 4, Part 5) – due August 7th

Week 6 Recorded Videos and Exams:

- Peregrine Falcon Recovery, DDT, Rachel Carson, Love Canal (Part 1, Part 2, Part 3, Part 4, Part 5) – due August 14th

Student Support

Writing Support

For help with improving your writing ability, the staff at the SDSU Writing Center is available online. Most students find it helpful to use technology tools to support the writing process. The following resources are provided as needed.

- Use a free Chrome browser plug-in such as Grammarly or MS Office tools to proofread and provide edits in real time in your own copy of MS Office.
- Review APA formatting:
  - APA Manual
  - Purdue University's OWL
  - APAStyle.org Quick Answers-Formatting
  - PC: Set up and use APA Formatting video or LibrarianEnumerations Blog
  - Mac: Set up and use APA Formatting video
  - Citation Machine tool for creating citations

Technical Support for Canvas

- https://its.sdsu.edu/canvas/

Expectations

Students are expected to watch all recorded videos in their entirety and complete all associated assignments and exams on time.

The instructor will respond to student email within 24-72 hours and will provide grades for assignments within 1-2 weeks of the due date.

Netiquette

Netiquette is online etiquette and is applicable to all course communications. It is important that all students be aware of proper behavior and show respect to one another.

Netiquette guidelines are common sense and ask all to use appropriate language for an educational environment:

- Use complete sentences
- Use proper spelling and grammar
- Avoid slang and uncommon abbreviations
- Avoid obscene or threatening language

The University values diversity and encourages discourse. Be respectful of differences while engaging in discussions. Consult SDSU's netiquette guidelines for more information.

Success in an Online Course

To succeed in the online environment, students should have the following:

- A computer with a stable Internet connection.
- Basic computer skills – email, Internet, and basic word processing.
- Microsoft Office 2010, or newer (must include Word and PowerPoint) or equivalent.

- An SDSU email address that will not change from the beginning until the end of the term.
- A "technology back-up" plan to complete assignments in case computer or Internet fails.
- Sufficient time - Online courses require as much time as face-to-face courses.
- Self-motivation to work with minimal supervision.

Students are also required to:

- Utilize all online course materials available via Canvas. Access to these materials is available after registration in the course.
- Participate in asynchronous online discussions.
- Complete readings and exams by the dates indicated on the schedule.
- Check email on a daily basis.

University Policies

Academic Honesty

The University adheres to a strict policy regarding cheating and plagiarism. These activities will not be tolerated. Become familiar with the policy and what constitutes plagiarism (http://studentaffairs.sdsu.edu/srr/cheating-plagiarism.html). Any cheating or plagiarism will result in failing this class and a disciplinary review by the University. These actions may lead to probation, suspension, or expulsion.

Examples of Academic Dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;

- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

Accessibility

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Ability Success Center at (619) 594-6473. You can also learn more about the services provided by visiting the Student Ability Success Center website.

To avoid any delay in the receipt of your accommodations, you should contact Student Ability Success Center as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Ability Success Center. Your cooperation is appreciated.

Student Support Services:

A complete list of all academic support services is available on the Academic Success section of the SDSU Student Affairs website.

Classroom Conduct Standards

SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
    1. physical abuse, threats, intimidation, or harassment.
    2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.

Medical-related Absences

Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. Student Health Services (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the Student Ability Success Center.

SDSU Economic Crisis Response Team

If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit sdsu.edu/ecrt, email ecrt@sdsu.edu, or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

Copyright Policy

SDSU respects the intellectual property of others and we ask our faculty & students to do the same. It is best to assume that any material (e.g., graphic, html coding, text, video, or sound) on the Web is copyrighted unless specific permission is given to copy it under a Creative Commons License. For more information about the use of copy written material in education, consult the TEACH Act and Copyright Fair Use Guidelines. Whenever possible, you should attribute the original author of any work used under these provisions.

Netiquette and Communication Guidelines

Consult SDSU's netiquette guidelines for information on appropriate communication.

Non-Discrimination Policy

SDSU is committed to providing a safe and welcoming campus environment for all students, faculty and staff. The CSU has affirmed its commitment to 'protecting access, affordability, intellectual freedom, inclusivity, and diversity for all students, including supporting DACA students.' Discrimination, harassment, or retaliation against students, faculty, and staff on the basis of race, religion, gender, sexuality, disability, nationality, immigration status and other categories of identity is prohibited. If you have concerns about your status at the university, visit the Student Affairs site for information or contact the Dean of Students or the Assistant Dean for Student Affairs in your College.

Religious Observances

According to the University Policy File, students should notify the instructors of affected

courses of planned absences for religious observances by the end of the second week of classes.

Standards for Student Conduct

The university is committed to maintaining a safe and healthy living and learning environment for students, faculty, and staff. Each member of the campus community should choose behaviors that contribute toward this end. Refer to the Center for Student Rights and Responsibilities to learn more.

Student Privacy / FERPA / Intellectual Property

SDSU complies with the federal Family Educational Rights and Privacy Act. Grades, personal identification and any other records will not be released to others without your express written permission. Refer to the Office of the Registrar for detailed information on student privacy.

The Family Educational Rights and Privacy Act (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. Your instructor may use [Canvas / Blackboard] to communicate with you, and will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the term or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

Land Acknowledgement

We stand upon a land that carries the footsteps of millennia of Kumeyaay people. They are a people whose traditional lifeways intertwine with a worldview of earth and sky in a community of living beings. This land is part of a relationship that has nourished, healed, protected and embraced the Kumeyaay people to the present day. It is part of a world view founded in the harmony of the cycles of the sky and balance in the forces of life. For the Kumeyaay, red and black represent the balance of those forces that provide for harmony within our bodies as well as the world around us.

As students, faculty, staff and alumni of San Diego State University we acknowledge this legacy from the Kumeyaay. We promote this balance in life as we pursue our goals of knowledge and understanding. We find inspiration in the Kumeyaay spirit to open our minds and hearts. It is the legacy of the red and black. It is the land of the Kumeyaay. Eyay e'Hunn My heart is good.