

**CHEM 330 ENVIRONMENTAL CHEMISTRY****Instructor Information**

Dr. Stephen Starnes

Office: Science 339

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Phone: 903-886-5389

Office Hours: T-F: 11:00 am - 12:00 pm or by appointment

**Course Materials**

Lecture textbook: Environmental Chemistry, fifth edition. By Collin Baird and Michael Cann. ISBN-13: 978-1-4292-7704-4, W. H. Freeman and Company. Please use the textbook as a reference. You are only responsible for material that we cover in class. Also, we do not necessarily cover the material in the same manner as does the book.

Classroom: Lecture

Section 01E: W 2:00-4:30 pm in STC 122

**Course Description:** 3 Semester Hours: 2 hours and 30 minutes lecture per week. This course is designed primarily for students majoring in sciences. Chemistry of the environment, including the hydrosphere and geosphere. Principles of physical, inorganic, and organic chemistry are applied to understand the origins of environmental pollutants, their transport, distribution, and decomposition pathways in water and soil environments. Principles of sensing and remediation of environmental contaminants are discussed. Chemists deal with these topics every day, but these concepts are also crucially important to other branches of science.

**Global Learning Outcomes**

Upon completion of the course, I intend for my students to have realized a number of objectives.

1. Students will be able to analyze, evaluate, or solve problems when given a set of circumstances, data, text or art. Be able to critically analyze a chemical problem and deduce a solution to the problem utilizing step-wise processes.
2. Students will be able to interpret, test and demonstrate principles revealed in empirical data and/or observable facts. Environmental chemistry requires good analytical skills. By the end of this course, you should be able to utilize mathematical skills to solve chemical problems.
3. In written, oral, and/or visual communication, A&M-Commerce students will communicate in a manner appropriate to audience and occasion, with an evident message and organizational structure.
4. Students will be able to work together toward a shared purpose relevant to the course or discipline with a sense of shared responsibility for meeting that purpose.

**Course General Content Knowledge Students Should Obtain**

- Know the importance of chemistry and its relationship to other disciplines and our daily lives.
- Identify factors that control the speciation of chemicals in different environments
- Distinguish cases where pollutant concentrations are controlled by transport or chemical transformations
- Present a written summary and an oral overview of an original scientific or news article
- Describe the concepts of global cycles, sources and sinks, and lifetimes of pollutants

- Calculate lifetimes and removal rates of pollutants
- Describe pollution control methods, regulations, and policies
- Describe the water pollution by heavy toxic metals and their bio-geochemical cycles
- Identify the various types of biological and chemical water pollutants and explain their effects
- Describe the water and sewage treatment process and explain the rationale for each step
- Describe the make-up of matter in terms of its elemental and molecular composition
- Describe the greenhouse effect, climate change; and distinguish between fossil fuels and renewable energy technologies
- Use chemical bonding models and molecular composition to recognize potential environmental impacts of substances (*e.g.*, water solubility, acidity)
- Analyze environmental scientific data using the scientific method to apply the effects of environmental chemistry on the ecosystems
- Explain basic concepts of water chemistry and water pollution
- 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
- Demonstrate the ability to use ethical reasoning to articulate a position on important environmental issues
- Apply quantitative problem-solving skills to questions in environmental chemistry.
- Compare/ contrast the chemistry of different environments within the hydrosphere.
- Describe and analyze intersections between environmental chemistry and society including applications of green chemistry.

### Course Requirements: Minimal Skills Needed

**Prerequisite:** The student must have completed Chem 1307 or Chem 2323 with a grade of C or better.

### Grading

Your course grade will be based on 1000 points total, broken down as follows:

- Midterm exam (250 points total, 25%)
- Comprehensive final examination (250 points, 25%)
- Homework and Quizzes (250 points total, 25%)
- Written report and oral presentation (200 points, 20%)
- Attendance and participation (50 points, 5%)

*Final Presentation:* Students will give a live 12-minute oral presentation, built around the cross-section between a scientific or popular press article of their choosing (but will require my approval) and course content.

*Late work will not be accepted. There will be NO make-up exams except for those missing an exam due to an A&M-Commerce sponsored event (such as an athlete participating in an A&M-Commerce athletic event or a student giving a conference presentation). Prior notification of participation in such an event MUST be given and make-up exam arrangements made in advance of the regularly scheduled exam.*

The final exam will be comprehensive over all material covered in the class. The last drop date for the course is **October 31, 2024**. Grading will be based on a standard percentage scale: 100-90 = A; 89-80 = B; 79-70 = C; 69-60 = D; 59-below = F. Dishonest scholarship will earn an automatic zero (0) and initiate prosecution to the fullest extent. Incomplete grades may be given only if the student

has a current average  $\geq 70\%$  and is precluded from completion of the course by a documented illness or family crisis. **If you miss 5 or more class periods and do not have a passing grade in the class, you may be administratively dropped from the class.**

**Exam details:**

During exams, students are not allowed to have the following items with them: scratch paper (unless provided by the instructor), course materials, textbooks, notes (including formula sheets), or electronic devices, including iPads, iPhones or any other type of smart phone or cellular phone, iPods, MP3 players, earphones, radios, cameras, multi-functional timepieces, computers, smart watches, or ANY device capable of accessing cellular or wireless networks.

When possible, students will sit in alternating seats, face forward at all times, and remove any clothing which might conceal eye movements, reflect images of another's work, or hide course materials for copying.

Only non-programmable calculators are allowed on exams. I recommend purchase of one of the following calculators, which are available for approximately \$10.00-\$15.00: TI-30X IIS (solar) or TI-30X IIB (battery) or TI-30Xa. NO OTHER CALCULATOR TYPE IS ALLOWED. ALL calculators will be checked before/during the exam. Non-approved calculators will be removed immediately from the student, to be returned at some point after the exam period.

**Course outline:**

Week 1: Wednesday August 28: Water chemistry and water pollution, Chapter 10

Week 2: Wednesday September 4: The pollution and purification of water, Chapter 11

Week 3: Wednesday September 11: Toxic heavy metals, Chapter 12

Week 4: Wednesday September 18: Toxic organic compounds, Pesticides, Chapter 13

Week 5: Wednesday September 25: Dioxans, Furans and PCBs, Chapter 14

Week 6: Wednesday October 2: Other toxic organic compounds, Chapter 15

Week 7: Wednesday October 9: Energy and the climate, Chapter 5

**Week 8: Wednesday October 16: Midterm exam**

Week 9: Wednesday October 23: Fossil fuels, CO<sub>2</sub> emission and sequestration, Chapter 6

Week 10: Wednesday October 30: Biofuels and alternatives sources of energy, Chapter 7

Week 11: Wednesday November 6: Renewable energy technologies, Chapter 8

Week 12: Wednesday November 13: Radioactivity and nuclear energy, Chapter 9

Week 13: Wednesday November 20: Student presentations

Week 14: Wednesday November 27: no class, Thanksgiving

Week 15: Wednesday December 4: Student presentations

**Week 16: Wednesday December 11: Final exam, 2-4:30 pm**

**Interaction with Instructor Statement**

The best way to communicate with the instructor is via e-mail: [stephen.starnes@tamuc.edu](mailto:stephen.starnes@tamuc.edu) or stop by the instructor's office (Science 339) for clarification of course material and expectations.

**TECHNOLOGY REQUIREMENTS****LMS – myLeo Online – D2L Brightspace**

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

[https://documentation.brightspace.com/EN/brightspace/requirements/all/browser\\_support.htm](https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm)

YouSeeU Virtual Classroom Requirements:

<https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements>

## ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or [helpdesk@tamuc.edu](mailto:helpdesk@tamuc.edu).

**Note:** Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

## COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

### Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here: <https://community.brightspace.com/support/s/contactsupport>

## COURSE AND UNIVERSITY PROCEDURES/POLICIES

### Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

### University Specific Procedures

#### Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the [Student Guidebook](#).

<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx>

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: [Netiquette](#)

<http://www.albion.com/netiquette/corerules.html>

**TAMUC Attendance**

For more information about the attendance policy please visit the [Attendance](#) webpage and [Procedure 13.99.99.R0.01](#).

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

**Academic Integrity**

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

[Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

[Graduate Student Academic Dishonesty 13.99.99.R0.10](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf>

**ADA Statement****Students with Disabilities**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

**Office of Student Disability Resources and Services**

Texas A&M University-Commerce

Velma K Waters Library- Room 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: [studentdisabilityservices@tamuc.edu](mailto:studentdisabilityservices@tamuc.edu)

Website: [Office of Student Disability Resources and Services](#)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

**Nondiscrimination Notice**

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

**Campus Concealed Carry Statement**

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the

State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

### **A&M-Commerce Supports Students' Mental Health**

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit [www.tamuc.edu/counsel](http://www.tamuc.edu/counsel)

### **AI use policy**

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course. Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism). Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed. In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

13.99.99.R0.10 Graduate Student Academic Dishonesty