Geochemistry

CoSMClass Syllabus / Policy

2020 / Fall Semester
GEOL 4320.001
Geochemistry

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Office Hours: MW 1:00 – 4:00; or by appointment

Class meeting time Online via Brightspace by D2L

Please feel free to call, email, or stop by any time to ask questions, discuss any problems you may be having with the material or to help facilitate further understanding. If these hours conflict with your schedule, please call or email to make an appointment.

COVID-19 Mask Policy

Although we do not have any face-to-face class meetings scheduled, you are welcome to visit with me in my office. University policy dictates that masks (cloth face coverings) must be worn over the nose and mouth at all times in university buildings and appropriate physical distancing must be observed. Students not wearing a mask and/or not observing appropriate physical distancing will be asked to leave. All incidents of not wearing a mask and/or not observing appropriate physical distancing will be reported to the Office of Student Rights and Responsibilities. Students who are reported for multiple infractions of not wearing a mask and/or not observing appropriate physical distancing may be subject to disciplinary actions.

More information on the SFA Policy for Face Coverings: http://www.sfasu.edu/fall2020

Information regarding face coverings and social distancing from the Centers for Disease Control:

Course Description

Over the past several decades environmental issues and problems have become an important area of study, occupying scientists from a number of disciplines. Geochemistry is a course that helps to gain understanding of the geochemical reactions that take place at or near the earth’s surface and the resulting environmental conditions. This course utilizes fundamental chemical concepts applied to reactions in aqueous solution.

Student Learning Outcomes

The student is expected to understand and apply the following concepts of geochemistry:
1. Understand the basic principles of chemical bonding and types of chemical reactions.
2. Apply the basic laws of thermodynamics and kinetics to chemical reactions.
3. Acid – Base Reactions and the buffering capacities of natural waters.
4. Carbon geochemistry and the formation of fossil fuels.
5. Geochemistry of the atmosphere, continent and marine environments.

Text and Materials

*Lecture Text: Principles of Environmental Geochemistry* G. Nelson Eby, 2004

*This text was reprinted by Waveland Press in 2016. You may be able to purchase or rent used copies through various online booksellers. More information on the text can be found [here](#).

Course Requirements

**GEOL 4320** Geochemistry meets for a minimum of 25 lecture contact hours during the semester, including the final exam. The lecture and laboratory must be completed concurrently. The grades for lecture and laboratory are combined into one single grade for the course. Students are required to complete assignments based on selected readings, along with periodic quizzes and exams over the course content. Successful completion of all elements for the course (both lecture and laboratory) requires at least six hours of additional out-of-class work each week.

The Federal Definition of the Credit Hour - a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours out of class student work each week for approximately fifteen weeks for one semester of credit.

Course Calendar

Background information from these topics will be posted on d2l as we progress through the semester. I will be pulling information from resources other than the text, so please be aware that the answer to every question is not always in your textbook. Please read the assigned material before we are scheduled to discuss it in our online meetings. This will facilitate your understanding of the material.

<table>
<thead>
<tr>
<th>Date</th>
<th>Proposed Topics</th>
<th>Assigned Reading Chapter</th>
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<tbody>
<tr>
<td>Aug 25, 27</td>
<td>Introduction, What is Geochemistry?</td>
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<tr>
<td>Sept 1, 3</td>
<td>Review of Basic Chemistry Principles</td>
<td>1</td>
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<tr>
<td>Sept 8, 10</td>
<td>Equilibrium Thermodynamics and Kinetics</td>
<td>2</td>
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<tr>
<td>Sept 15, 17</td>
<td>Aqueous Complexes, Acid-Base Equilibria</td>
<td>2, 3</td>
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<tr>
<td>Sept 22, 24</td>
<td>Buffers, Mineral-Water Reactions</td>
<td>3</td>
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<tr>
<td>Sept 29 - Oct 1</td>
<td>Oxidation-Reduction Reactions</td>
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<tr>
<td>Oct 6, 8</td>
<td>Basics of Carbon Chemistry, Soils</td>
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<tr>
<td>Oct 13, 15</td>
<td>Fossil Fuels, Midterm Exam (15th)</td>
<td>5</td>
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<tr>
<td>Oct 20, 22</td>
<td>Anthropogenic Carbon, Isotopes</td>
<td>6</td>
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<tr>
<td>Oct 27, 29</td>
<td>Environmental Mineralogy</td>
<td>7</td>
</tr>
<tr>
<td>Nov 3, 5</td>
<td>Overview of the Atmospheric Environment</td>
<td>8</td>
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</table>
Overview of the Continental Environment 9
Overview of the Marine Environment 10
Thanksgiving Holidays
Presentations

Tentative Examination Schedule

Midterm Exam: October 15, due October 19 @ 5:00 p.m.
Final Exam: December 3, due December 7 @ 5:00 p.m.

Grading Policy

Two major tests of 100 points each will be given during the semester. The midterm and final exams will be administered as a take home exams; the midterm exam will open Thursday, October 15 and is due Monday, October 19 at 5:00 p.m. The final exam will open Thursday, December 3 and is due Monday, December 7 at 5:00 p.m. All tests are comprehensive and basic understanding of chemistry will be emphasized. Regular attendance in online meetings and participation in lecture readings are necessary for full understanding of the course material.

You will be asked to work in small groups to create a presentation for the final week of lecture, with the topic of "New Applications for Geochemical Data". These presentations will be given the final week of the course, on December 1 and 3, during our scheduled class time. This presentation is worth 50 points.

Weekly discussion posts will be assigned to further explore the topic we are studying. Each discussion post is worth 5 points, with a total of 70 points available for the semester.

Laboratory time will be your chance to gain practical experience interpreting and manipulating various geochemical data sets. Homework and laboratory will be an important component of your final grade. Laboratory work and homework will be assigned on Tuesday during laboratory and due the following Monday at 10:00 p.m. The Dropbox feature on the d2l platform will be utilized, so no late work will be accepted. See the lab and homework schedule for more detail.

We will utilize existing data sets to describe geochemical phenomena in the natural environment. Although you may work in groups, you will each write a laboratory report detailing the experiment, chemical reactions and conclusions using the format posted on the class webpage. The reports are due the following Monday at 5:00 p.m.

There is a possible 670 points (320 points from lecture and 350 points from laboratory activities) available for this class. Grades from the lecture and lab will be combined; your grade will be based on the ratio of the number of points you earn divided by 670.

Grade Scale: 90 – 100 = A, 80 – 89 = B, 70 – 79 = C, 60 – 69 = D, < 60 = F

All written work such as homework, lab reports, essay answers to test questions, and any other work submitted will be processed through TurnItIn, a verification tool administered through the d2l platform, to check for plagiarism and similarity of content. Your answers must be in your own words and if you are using research material as the basis for your answer, you must cite your sources. All works with evidence of plagiarism will receive a zero for the first offense; the second offense will be referred to the
SFA Judicial Office. If your written material is too similar to another student in the class, it will be assumed you are sharing answers – otherwise known as cheating. All students involved will receive a zero for the assignment.

Laboratory Schedule (Tuesdays 2:00 – 4:30)

<table>
<thead>
<tr>
<th>Date</th>
<th>Assignment</th>
<th>Points</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>8/25</td>
<td>Lab 1 – Journal Article Summary and Discussion</td>
<td>25</td>
<td>8/31</td>
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<td>9/1</td>
<td>Lab 2 – Review of Basic Chemical Principles</td>
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<td>9/7</td>
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<td>9/8</td>
<td>Lab 3 – Equilibrium/Kinetics</td>
<td>25</td>
<td>9/14</td>
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<td>9/15</td>
<td>Lab 4 – Aqueous Complexes</td>
<td>25</td>
<td>9/21</td>
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<td>9/22</td>
<td>Lab 5 – Buffers, Mineral-Water Reactions</td>
<td>25</td>
<td>9/28</td>
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<td>9/29</td>
<td>Lab 6 – Oxidation/Reduction Reactions</td>
<td>25</td>
<td>10/5</td>
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<td>10/6</td>
<td>Lab 7 – Carbon Cycle</td>
<td>25</td>
<td>10/12</td>
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<td>10/13</td>
<td>Lab 8 – Fossil Fuels</td>
<td>25</td>
<td>10/19</td>
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<td>10/20</td>
<td>Lab 9 – Anthropogenic Carbon</td>
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<td>10/26</td>
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<td>10/27</td>
<td>Lab 10 – Environmental Mineralogy</td>
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<td>11/2</td>
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<td>11/3</td>
<td>Lab 11 – Air Chemistry</td>
<td>25</td>
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<td>11/10</td>
<td>Lab 12 – Spring Chemistry</td>
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<td>11/16</td>
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<td>11/17</td>
<td>Lab 13 – Ocean Chemistry</td>
<td>25</td>
<td>11/20*</td>
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<td>11/24</td>
<td>Thanksgiving – Enjoy!</td>
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<tr>
<td>12/1</td>
<td>Lab 14 – Journal Article Summary and Discussion</td>
<td>25</td>
<td>12/4*</td>
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*Labs 13 and 14 will be due Friday due to the Thanksgiving holiday and Final Exam Schedule.

Attendance Policy

Attendance and participation are mandatory for understanding the material.

Research Opportunities

During the fall and spring semester, the Geology Department encourages individual and group directed research projects for undergraduate and graduate students. These projects can be presented in departmental meetings, the Undergraduate Research Conference at SFA, regional, state and national academic meetings such as Texas Academy of Science, AAPG and GSA. If you are interested, please let me know.

Academic Integrity (A-9.1)

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are...
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(1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

**Withheld Grades Semester Grades Policy (A-54)**

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

**Students with Disabilities**

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), HumanServicesBuilding, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.