TEXAS A&M UNIVERSITY – CORPUS CHRISTI
COLLEGE OF SCIENCE AND ENGINEERING

GEOLOGY 4416.001 INTRODUCTION TO GECHEMISTRY

Department of Physical and Environmental Sciences
Fall, 2019

A. COURSE INFORMATION
Course number/section: GEOL 4416.001
Class meeting time: MW 2:00 – 3:15 pm
Class location: BH 202

Lab section and meeting time: W 03:30 – 05:20 pm
Lab location: CS 226

Course website: Blackboard  http:// Bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
Instructor: Dr. Valeriu Murgulet
Office location: CS 205
Office hours: Tuesday 11:00 am – 12:15 pm; Tuesday 01:45 pm – 2:30 pm; Wednesday 09:00 am – 12:00 pm or by appointment
Telephone: (361) 825-6023
e-mail: valeriu.murgulet@tamucc.edu

Lab Instructor: TBD

C. COURSE DESCRIPTION
Catalog Course Description
Advanced study of the Earth processes using principles of chemical equilibrium, thermodynamics, isotope geochemistry and organic geochemistry. Applications of low-temperature geochemistry to geologic problems.

Extended Course Description
This course presents conceptual and quantitative principles of geochemistry in order to improve understanding of natural processes at and near the earth’s surface, as well as anthropogenic impacts on the natural environment. It reviews basic chemical principles applied to environmental and low-temperature geochemistry and it deals with the importance of minerals in the environment, principles of aqueous geochemistry, elemental speciation and reduction-oxidation reactions, silicate and carbonate geochemistry, the roles of stable isotopes
in environmental analysis and principles of instrumental analysis in environmental geochemistry.

D. PREREQUISITES AND COREQUISITES

CHEM 1311 and CHEM 1111, CHEM 1312/1112, MATH 2413, GEOL 3414 and/or with instructor’s permission.

SMTE-0094 Geology Lab Safety Seminar

E. REQUIRED TEXTBOOK, READINGS AND SUPPLIES

Required Textbook

Optional Textbook(s) or Other References

Supplies: pencil, colored pencils, ruler, protractor,

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

By the end of this course, students will be able to:

1. Review the fundamentals and applications of geochemistry and its relevance in the Earth processes.
2. Discuss the most important concepts of inorganic, organic and isotope geochemistry.
3. Discuss current issues in the field of geochemistry.
4. Apply geochemical models and equations to solve geochemical problems.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

The class will meet on Mondays and Wednesdays throughout the semester in the classroom to cover the geochemistry topics. Lecture power point slides, class exercises, discussions will be used while in the classroom. Class lectures prepare you for the lab assignments. In addition, you are expected to read relevant textbook chapters as announced in class in preparation for lecture and lab assignments. Thus, laboratory exercises will complement the material presented during the lectures.
MAJOR COURSE REQUIREMENTS AND GRADING

The student learning outcomes described in Section F will be measured through the assignments listed below.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Three Exams</td>
<td>30%</td>
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<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Lecture Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Presentation</td>
<td>10%</td>
</tr>
<tr>
<td>Lab assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Comprehensive Final Exam</td>
<td>15%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Six problem sets will be assigned throughout the semester and are due a week later. You must do your own work. Late problems sets will receive half credit and will not be graded if turned in after graded problem sets have been handed out.

PRESENTATION

Each student will select a topic from an approved list, research the topic, give a 15 minute presentation and write an eight page paper. The subject of the presentation will be chosen in consultation with the instructor.

H. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>TEXTBOOK CHAPTER/ LECTURE TOPIC</th>
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<tbody>
<tr>
<td>08/26</td>
<td>Introduction. Equilibrium Thermodynamics and Kinetics</td>
</tr>
<tr>
<td>09/03</td>
<td>Ion Activities. Solubility Products. Saturation.</td>
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<tr>
<td>09/09</td>
<td>Acid-Base Equilibria</td>
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<tr>
<td>09/16</td>
<td>Oxidation-Reduction Reactions: Oxidation-Reduction Diagrams. The Role of Microorganism in Redox Reactions.</td>
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<tr>
<td>09/23</td>
<td>Oxidation-Reduction Processes in Natural Systems. <strong>Exam 1</strong></td>
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<tr>
<td>09/30</td>
<td>Surficial and Environmental Mineralogy</td>
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<tr>
<td>10/07</td>
<td>Carbonate Geochemistry and the Carbon Cycle</td>
</tr>
<tr>
<td>10/14</td>
<td>Radioactive Isotopes; <strong>Exam 2</strong></td>
</tr>
<tr>
<td>10/21</td>
<td>Stable Isotope Geochemistry</td>
</tr>
<tr>
<td>10/28</td>
<td>Biogeochemical Cycles – N, P, S</td>
</tr>
</tbody>
</table>
11/11 **Exam 3:** The Continental Environment
11/18 Geochemistry of Surface and Ground Waters
11/25 The Marine Environment. Seawater Chemistry
12/02 Geochemistry of Marine Sediments
12/11 **Final Exam** 1:45 – 4:15 pm

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams listed are directly related to the Student Learning Outcomes described in Section F.

I. **COURSE POLICIES**

**Attendance/Tardiness**
The grade you will receive for this course is based on your performance on exams, quizzes and exercises and lab assignments.

**Late Work and Make-up Exams**
Work is due by the stated deadlines. Exams may be made up only in cases of an excused absence (e.g., doctor’s excuse) and students should contact the instructor in advance to make prior arrangement if possible.

**Extra Credit**
None

**Cell Phone Use**
Not allowed.

**Laptop Use**
Only for taking class notes.

**Food in Class**
Not allowed.

**Missed Exam**
Students who must miss an exam should contact the instructor in advance to make arrangements to make up the missed exam. If the absence is unplanned, you should contact the instructor as soon as possible about the situation. Students who miss an exam or pop quiz due to excused absence may make it up. Exam and quiz makeups should be completed as soon as possible.

**Participation**
Students are encouraged to actively participate in lecture discussion. Generally students
who participate more actively are able to learn the material more effectively.

J. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. *Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course.* Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  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 believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

K. **OTHER INFORMATION**

- **Academic Advising**
The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

GENERAL DISCLAIMER
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.