GEOL 4308, GEOL 5301 Section 001 Environmental Geochemistry
EVSE 5310 Section 001 Environmental Systems – Chemical Aspects
Fall 2016

Instructor: Dr. Elizabeth Griffith

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Office Hours: Wednesday 9:30-noon, or by appointment

Section Information: GEOL 4308, GEOL 5301, EVSE 5310 Section 001

Time and Place of Class Meetings: Tuesday & Thursday 2:00-3:20pm, Geoscience Bldg. Room 109

Description of Course Content: "*Fundamentals of low-temperature aqueous geochemistry, and anthropogenic impacts on natural water systems. Topics include equilibrium thermodynamics, kinetics, aqueous complexation, and oxidation/reduction processes that affect metals and organic matter in natural waters.*"

The course is for designed for upper level undergraduate and graduate students interested in the chemical processes that influence the Earth system including global and local phenomena and impacts that humankind has on the natural environment. The assigned readings have been selected to familiarize students with key concepts. Class activities focus primarily on how to apply these concepts in the environmental system.

This course counts as part of the Environmental and Sustainability Studies Minor, a minor that is open to students in all majors, in all colleges. For more information about ESS classes, requirements, advising or the FB group see:
http://www.uta.edu/english/alaimo/For%20ESS%20Minors%20(Environmental%20and%20Sustainability%20Studies).html

Student Learning Outcomes:

1. Using their understanding of chemical thermodynamics and kinetics, students will be able to model and predict the geochemical processes that control the chemistry of natural waters and their evolution in the hydrological cycle.
2. Students will be able to explain and discuss environmental geochemical data and their significance with their peers.
3. Through the creation and completion of a written research project, students will gain insight into science behind today's environmental issues.

Required Textbooks and Other Course Materials:
Ryan, P., 2014, *Environmental and Low Temperature Geochemistry*, Wiley-Blackwell, West Sussex, UK, 416 p.; ISBN: 978-1-4051-8612-4
Text Website: http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1405186127&bcsId=8933

Descriptions of major assignments and examinations: The course will be taught following Team-Based-Learning (TBL) format. You will be assigned to teams with approximately 4-5 members on the first day of class. There will be 8 short multiple-choice **Readiness Assurance Tests** (RATs) given during the course, one at the beginning of each unit. (The same RATs will be given to individuals (iRAT) and teams (tRAT).) The typical RAT measures your comprehension of the assigned reading. The individual tests are scored and reviewed while your team completes the team test. Once the team test period is over, the

instructor may give a short mini lecture to clarify concepts that are not well understood as evidenced by the test scores. The purpose is to ensure that you and your teammates have sufficient foundational knowledge to begin learning how to apply and use the course concepts. All team members will receive the same grade for the tRAT (regardless if they are absent or present, an individual's contribution to teamwork and success is assessed separately, see below). Individuals are assessed individually on their completed iRAT (earning a zero if absent).

You and your team will then solve **application problems**, prepare arguments, create explanations and make predictions during the in-class team exercises. Near the end of each module, you will submit your answers to be evaluated and shared with the entire class for a discussion. On team application problems, all team members will receive the same score (again, an individual's contribution to teamwork and success is assessed separately, see below).

The **midterm** and **final exam** will be individual exams only.

Grades will also be given as determined by **peer assessments** at the midterm and final regarding "Helping" Behavior or "Team Maintenance". Each individual will rate the contributions of all the other members of their team. Individual Team Maintenance (peer assessment) scores will be the average of the points they receive from the members of their team. Assuming arbitrarily that 1) 'helping behavior' is worth 10 points, and 2) there are five members in a team: Each individual must assign a total of 40 points to the other four members in their team. Raters must differentiate some in their ratings (each rater has to give a score of 11 or higher – max of 15 – and at least one score of 9 or lower). Team Maintenance scores will produce differences in grades only within teams. As a result, team members can't help everyone in their team get an A by giving them a high peer evaluation score. The only way for everyone in a team to earn an A is by doing an outstanding job on the individual exams and team exams and projects!

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I mandate attendance is required. There are no make-up iRATs or tRATs, but the lowest score is dropped. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

Other Requirements: GEOL 2445 and CHEM 1441 or *approval by prof.*

Products and Assessment: Grades will be based on the following:

Application Problems (*9, 30 points each, drop lowest*)	240 points
iRAT *(individual MC tests, 9, 20 points each, drop lowest)*	160 points
tRAT (*team MC tests, 9, 20 points each, drop lowest*)	160 points
Peer Assessment (*midterm & final, 70 points each*)	140 points
Exams (*midterm & final exams, 100 points each*)	200 points
Final Written Project (*lose points for missing deadlines*)	200 points
	TOTAL: 1100 points

All products will be evaluated on the basis of scoring rubrics, which will be distributed with the assignment. **Note: *Graduate students*** are expected to initiate discussion amongst their peers inside and outside of the classroom. Expectations for the final written project are higher for graduate students, as indicated in the grading rubric. Graduate students are also required to make a short presentation on the major findings of their written project (grade included in final written project points).

Grading:
The following percentages will yield letter grades:
100-90 **A**; < 90-80 **B**; < 80-70 **C**; <70 -60 **D**; < 60 **F**

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see "Student Support Services," below.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 6-9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.*

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week: for semester-long courses**,** a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located from the hallway outside of the rear of the room. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.

The IDEAS Center (2nd Floor of Central Library) offers **free** tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

The English Writing Center (411LIBR): The Writing Center Offers free tutoring in 20-, 40-, or 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Our hours are 9 am to 8 pm Mon.-Thurs., 9 am-3 pm Fri. and Noon-6 pm Sat. and Sun. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, workshops, and specialized services for graduate students are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. http://library.uta.edu/academic-plaza

Course Schedule. *See table on following page*

Dates for final written project (THURSDAY 5:00 pm DEADLINES ON BLACKBOARD):

1. Pick Research Question: by THURSDAY 1 September 5pm
2. Bibliography List (working list, min. 4 ref): by THURSDAY15 September 5pm
3. Paper Outline: by THURSDAY 6 October 5pm
4. Deadline to meet with Writing Center AND rough draft due: by THURSDAY 3 November 5pm
5. Review of Peer Draft Due: by THURSDAY 17 November 5pm
6. Final Paper Due: by THURSDAY 1 December 5pm

*Graduate Student presentations TUESDAY 6 December 2:00-3:20pm

"*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course." –Elizabeth M. Griffith*

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Class website at **elearn.uta.edu (Blackboard)**

Week Date	***Pre-*Class Reading**	**Topic**	***In*-Class Application Problems**	**Final Project Deadlines**
1 Aug 25		**Syllabus Review;** **Practice Module:** Introduction to environmental geochemistry; Form Teams iRAT and tRAT **(practice)**	**(practice)**	
2 Aug 30, Sept 1	(CH. 1)	**Geochemistry survey/review;** Pick research question in teams (coordinate topics within each team from team theme)	**AP practice**	Submit research question (September 1st)
3 Sept 6, Sept 8	CH. 1	**Module 1:** Chemical Principles: Thermodynamics & Kinetics iRAT and tRAT	**AP1** due	
4 Sept 13, Sept 15	CH. 2	**Module 2:** Surficial & Environmental Mineralogy iRAT and tRAT	**AP2** due	Working bibliography due (min. 4 refs) (September 15th)
5 Sept 20, Sept 22	CH. 3 *TCU prof*	**Module 3:** Organic Compounds iRAT and tRAT	**AP3** due	
6 Sept 27, Sept 29	CH. 4 (GSA)	**Module 4:** Aqueous Systems iRAT and tRAT		
7 Oct 4, Oct 6		**Module 4 (contd):** + Review for Midterm exam	**AP4** due	Outline due (October 6th)
8 Oct 11, Oct 13		**Exam over Modules 1-4 +** **Midterm peer assessment;** Review exam; overview final project		
9 Oct 18, Oct 20	CH. 5	**Module 5:** Carbonate chemistry, C cycle iRAT and tRAT	**AP5** due	
10 Oct 25, Oct 27	CH. 6	**Module 6:** N, P, and S Cycles iRAT and tRAT	**AP6** due	
11 Nov 1, Nov 3	CH. 7, 8	**Module 7:** The Atmosphere iRAT and tRAT	**AP7** due	Draft of final project & writing center mtg (November 3rd)
12 Nov 8, Nov 10	CH. 9	**Module 8:** Earth's Critical Zone; Weathering iRAT and tRAT		
13 Nov 15, Nov 17		**Module 8 (contd):** Geochemical Modeling	**AP8** due	Peer reviews due (November 17th)
14 Nov 22 (Thanks.)	CH. 10, 11	**Module 9:** Environmental Isotopes iRAT and tRAT		
15 Nov 29, Dec 1		**Module 9 (contd):** Isotope hydrology iRAT and tRAT	**AP9** due	**Final Written Project Due (December 1st)**
16 Dec 6		**Graduate students: 1-slide presentations** on final project, Final exam review		
Dec 12-16	Finals week *(AGU)*	**FINAL EXAM (cumulative)** **TUESDAY, Dec. 13th 2-4:30pm** **Final summative peer assessment**		