CoSM Class Syllabus / Policy

2020 / Spring
GOL 523.001
Aqueous Geochemistry

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Office Hours: MW (8:00-11:00) or by appointment

Class meeting time and place: T 19:00 – 21:30 : Miller Science 333
Text and Materials: material will primarily come from the following textbooks in this course, but will be supplemented with additional resources including assigned papers.

• *Groundwater Geochemistry and Isotopes*, Clark (2015)—recommended
• *Aqueous Environmental Geochemistry*, Langmuir (1997)—recommended
• *The Geochemistry of Natural Waters* (3rd Edition), Drever (1997)—recommended

Course Description:
Aqueous Geochemistry (GOL 523) - Three semester hours, three hours lecture. An in-depth investigation into chemical reactions that occur in natural waters, including detailed descriptions of thermodynamic and kinetic modeling, chemical speciation, mineral dissolution/precipitation, and redox cycling. Classroom time will be split between, 1) lectures covering theory and quantification of hydrogeologic process and 2) group discussion of case studies.

Program Learning Outcomes:
There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and / or a service course.

General Education Core Curriculum Objectives/Outcomes:
The objective of GOL 523 is to gain an understanding (quantitative and qualitative) of the chemical behavior of water resources. Throughout the course qualitative characterization of reservoir-scale geochemical processes will be coupled with site specific quantitative geochemical characterization in order to gain and understanding of basin-scale aqueous geochemistry processes. Critical analyses skills will be developed through evaluated case studies

Student Learning Outcomes:
The student is expected to understand and apply the following concepts of Applied Hydrogeology:

1. Utilize thermodynamic principles to address chemical speciation in natural waters.
3. Utilize kinetic principles to address the rate of reactions in natural water systems.
4. Understand the role of microbial redox cycling and its influence on natural water systems.
5. Address complex environmental problems concerning water quality, contaminant transport, and water-rock interactions.

Course Requirements:
Aqueous Geochemistry (GOL 523) is designed to provide an overview of the quantitative and qualitative aspects of the geochemistry of aqueous systems. This course includes two exams (midterm and final), weekly content quizzes, and weekly reviews of scientific papers. Suggested homework assignments will be given but not required; however, students are strongly encouraged to complete these assignments in order to ensure success on exams. Additional required homework may be given and graded to test fundamental knowledge throughout course. See section on Grading Policy below.
Student learning of lectures will be evaluated through two exams. Tentative schedule:

- Midterm (03 March 2020) – Exam focus on fundamentals of aqueous geochemistry including classroom lectures and discussions, including all lecture material covered in class between 21 Jan 20 and 25 Feb 20. Midterm exam will count 100 points towards the semester grade.
- Final (21 April 2020) – Comprehensive final that covers all topics discussed throughout the course. Final exam will count 100 points towards the semester grade.
- Class Presentations (28 April 2020 & 05 May 2020) – graduate student presentation of the natural geochemistry of a unique hydrogeologic setting with topic to be arranged with course instructor. Students will submit a 200 word proposal of the review topic they wish to investigate for approval by 04 February 2020. Classroom presentations will be 15 minutes in length on either 28 April 2020 or 05 May 2020. Presentations will count 100 points towards the semester grade.
- Homework – recommended weekly homework assignments will be given that correlate with the topics of discussion for that week of classroom activity. Homework assignments will not be submitted nor graded.
- Quizzes – weekly quizzes will be administered at the beginning of every lecture period that covers the topics of discussion for the previous lectures to ensure that comprehension is maintained throughout the semester. Weekly quizzes counting 20 points each (8 quizzes totaling 160 points)
- Scientific Papers – weekly lectures will be supplemented with critical review of research papers. All students are expected to participate in classroom discussion and provide a list of talking points (scientific pros and cons) about the weekly paper assignment and individual students will be assigned as the moderator for each discussion. Weekly discussions counting 20 points each (9 discussions totaling 180 points).

**Course Calendar:**

Tentative schedule of topics to be covered in GOL 523 include:

Note: associated recommended reading for each lecture is in parentheses

- 21 Jan 20 – Introduction to Course [no reading assignment]
- 28 Jan 20 – Water, Solutes and Fundamentals [Clark (Ch 1); Drever (Ch 1); Langmuir (Ch 2-5)]
- 04 Feb 20 – Aqueous Thermodynamics [Clark (Ch 2); Drever (Ch 2); Langmuir (Ch 1)] – Quiz
- 11 Feb 20 – Aqueous Kinetics [Clark (Ch 3); Drever (Ch 11); Langmuir (Ch 2-5)] – Quiz
- 18 Feb 20 – Geochemical Reactions [Clark (Ch 3); Drever (Ch 2); Langmuir (Ch 2-5)] – Quiz
- 25 Feb 20 – The Carbonate System [Clark (Ch 6); Drever (Ch 3); Langmuir (Ch 6)] – Quiz
- 03 Mar 20 – **Mid-Term Exam**
- 10 Mar 20 – Spring Break (no class)
- 17 Mar 20 – Graduate Fieldwork (no class)
- 24 Mar 20 – Isotopes [Clark (Ch 4); Drever (Ch 14); Langmuir (Ch 13)] – Quiz
- 31 Mar 20 – REDOX [Clark (Ch 3); Drever (Ch 7-8); Langmuir (Ch 11)] – Quiz
- 07 Apr 20 – Contaminant Hydrogeology [Clark (Ch 9; Drever (Ch 16); Langmuir (Ch 10)] – Quiz
- 14 Apr 20 – Tracers in Aqueous Systems [Clark (Ch 5)]– Quiz
- 21 Apr 20 – **Comprehensive Final**
- 28 Apr 20 – Graduate Presentations 1
- 05 May 20 – Graduate Presentations 2

**Grading Policy:**

There is a possible 640 points available in this course: midterm exam (100 points), final exam (100 points), geochemical presentation (100 points), weekly quizzes (8 @ 20 points each), and weekly discussion (9 @ 20 points each). Your grade will be calculated based on the percentage of points you earn towards the maximum of 640 points – no bonus assignments are given in this course. Final letter grades will be assigned based on the following percentage ranges of points scored

- A = 90-100 (>576 total points earned)
- B = 80-89.9 (>512 total points earned)
• C = 70-79.9 (>448 total points earned)
• D = 60-69.9 (>384 total points earned)
• F = <59.9 (<384 total points earned)

All exams may include a multiple-choice section with additional sections will vary between exams but may include any or all of the following sections: 1) true / false questions; 2) fill in the blank questions; 3) short answer questions; 4) figure illustration; 5) short essay questions. All exams will take place in room 330 unless otherwise stated in class.

Cell phones, calculators, and other electronic devices are NOT permitted during exams. If you are using them in an exam, it will be assumed that you are cheating and you will receive a grade of “0” on that exam.

Exam scheduling conflicts for officially sanctioned university reason will be accommodated at a different time or date. In the event of such conflicts, you must inform me at least one week prior to the exam to reschedule your exam.

Make-up exams are only given in documented cases of official university activities, illnesses or deaths in the family. If the final is missed for a legitimate excuse, an “Incomplete” will be given at the final and a make-up exam can be taken at the beginning of the next semester. Make-up exams will be different than the regular class exam and may be entirely essay format.

Attendance Policy:
• Daily attendance will be taken for university accounting purposes. Success in this course will reflect the level effort you put into the course.
• Be prepared for lectures by reading the material to be covered in lecture prior to attending class. Questions are encouraged and welcome – do not hesitate to ask questions in class.
• No electronic devices are needed during lectures for this class, including cell phones and calculators. Please turn them off and do not use them in class. Ringing phones and beeping electronics disturb others in the class and interrupt lectures. If you interrupt class with your personal electronic devices, you will be asked to leave for the day.
• If you are late to class, please seat yourself quietly. Try not to be late because it interrupts others in the class. If you need to use the restroom or become ill, please excuse yourself from the lecture quietly.
• If you need to study for another class, do it elsewhere. The classroom is not the place to sleep. Basically, refrain from activities in lectures that distract or disturb other students in the room, because you are all paying for the class and most people want to get what they are paying for.

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 (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), Human Services Building, 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/.