HYDROGEOCHEMISTRY
GLY 5245, Section 6565; GLY4930, Section 1258
Spring 2022

Instructor:	Dr. Jon Martin
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Office Hours:	2-3 pm Tues/Thurs or by appointment (call or email first)
Meeting Place:	214 Williamson Hall
Meeting Time:	Tues./Thurs. TBD; some fraction of 3rd and 4th periods (9:35 – 11:30)
Recommended Text:	*Geochemistry of Natural Water, 3rd edition*, by James Drever - out of print
Useful texts:	*Aqueous Environmental Geochemistry*, Donald Langmuir
	Aquatic Chemistry, Werner Stumm and James Morgan
	The Global Water Cycle Elizabeth Berner and Robert Berner
	Geochemistry, groundwater and pollution, 2nd edition, by CAJ Appelo and D. Postma

Objectives and learning outcomes:

The objectives of this course are to introduce you to thermodynamic and kinetic controls on the chemical composition of "natural" water (i.e., we will not study waste water, water management, water treatment plants, or similar engineered systems). We will start with methods to describe solute concentrations and graphically represent the concentrations. For most of the course we will apply physical chemical principles to a variety of reactions, mostly between fresh water and the atmosphere, carbonate, silicate, and iron-oxide minerals, as well as reactions in seawater and with other mineral phases. At the end of the class, you should:

1) convert between various units to describe water chemical compositions, graphically represent the data, and use the data to evaluate controls on water compositions;
2) have a thorough understanding of the theory behind the chemical controls on natural water in multiple systems (groundwater, surface water, seawater);
3) be able solve fundamental problems related to the control of water chemistry and reactions between water and rocks, minerals, and organic matter;
4) develop proficiency in several computer applications to be able to solve similar problems.

Class Logistics:

General information. The course will include lectures on material from various textbook and other sources. All information you need will be posted on Canvas so it will be useful to check the class website frequently. Although the class will include some lectures, I encourage questions and discussion during the lectures. Attendance is expected and most of the test material will come from the lectures. I will not take attendance unless it drops off through the semester. If I am forced to take attendance, the grading policy will shift to reflect that change. The lecture material will be reinforced by occasional problem sets, approximately one every week or two. The problem sets will be turned in individually, but I encourage working collectively on them. We may have occasional recitation sessions in class to work over some of the problems. Some ground rules for the homework:

NEATNESS COUNTS. If I don't understand your answers, it will be a problem.
NO LATE WORK WILL BE ACCEPTED!

Software. Some of the problems will require the use of geochemical modeling programs including Geochemist Workbench (a commercial product) and PHREEQc (a free product from the US Geological Survey). Some of the exercises may be completed using Excel and it is often easier to manipulate data in Excel and then copy the data into the various programs. I assume everyone is familiar with Excel, but if not, please let me know and we will go over that program as well. We will start with Geochemist Workbench. You can download a community version for free at https://community.gwb.com/. You should download the program soon – it will be used in the initial problem set. We will use the PHREEQc later in the semester and I will provide more information then. If you are curious, the program may be downloaded at http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/.

Class activities. Only five people are currently signed up for the class and no good single text is in press any longer. Both of these issues limit using standard team-based learning (TBL) techniques, which are designed to encourage student preparation prior to lectures and participation during the class period. Consequently, I plan to use a modified version of TBL; specifically, I will periodically (~2 to 3 weeks) give short, multiple choice quizzes that will follow the format of Readiness Assurance Tests (RATs). Material in the RATs may cover information that I have covered in lectures, but where possible will include information in assigned readings prior to the lectures. The RATs will be taken individually (iRATs) and then immediately afterward they will be taken collectively by everyone in the class (tRATs). One cumulative final will take place the last day of class and that exam will be completed individually.

Grading policy:

Grades will be assigned on the basis of the problem sets, RATs, and the final exam:

Work Required	**Tentative Dates**	**Total Value (%)**
Homework	Variable	60
iRAT	Variable	5
tRAT	Variable	15
Final exam	April 29	20
Total		**100**

Grading scale: ≥93 = A; 90-92 = A-; 87-89 = B+; 83-86 = B; 80-82 = B-, etc. Values will be rounded to nearest whole numbers.

The final exam is formally scheduled for April 29, 12:30 to 2:30 but that time and date can be modified if everyone in the class agrees to the change. Missing the final is highly discouraged, but a make-up exam will be granted if a written excuse is brought from a doctor (for illness) or mortician (for a death in the family). It will be impossible to make up the RATs and if you miss them with an unexcused absence you will receive zero points. With an excused absence, that RAT will not be factored into your final grade.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Click here for guidance on how to give feedback in a professional and respectful manner. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students here.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see the Notification to Students of FERPA Rights.

Campus Resources:

Health and Wellness

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or police.ufl.edu.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling.

Library Support, Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints Campus

On-Line Students Complaints