

CWR6252: ENVIRONMENTAL BIOGEOCHEMISTRY OF TRACE METALS

Class Periods: MWF, 8th period (3:00 to 3:50 pm)

Location: CSE E112

Academic Term: Spring 2022

Instructor

Dr. Jean-Claude Bonzongo

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Office location: 308 Black Hall

Zoom Office Hours: 7:30 – 8:30 PM, URL: <https://ufl.zoom.us/j/98134254698>

Course Description

This course focuses on the fate and impacts of trace metals/metalloids as they cycle through geological and biological environmental compartments. The course emphasizes geological and chemical principles that drive the distribution, speciation, and bioavailability of trace metals as well as their interaction and dynamics in soils and aquatic systems. It is designed to provide students with a scientific basis for biogeochemical methods and a foundation upon which they can develop the ability to analyze, predict, and solve environmental problems related to metal pollution.

Course Pre-Requisites / Co-Requisites

Include one or more of the following: general chemistry, organic chemistry, biochemistry, soil and/or water chemistry, or permission of the instructor.

Course Objectives

Provide students with a scientific basis to biogeochemical approaches and a foundation upon which they can develop the ability to analyze, predict, and solve environmental and engineering problems related to metal pollution. Students who successfully complete this course should be able to: (1) identify, formulate, and solve problems related to water pollution in natural and engineered systems, (2) apply knowledge of mathematics, chemistry, and engineering; and (3) acquire knowledge on fate and environmental health impacts of pollutants in aquatic systems.

Lectures: days & times

This course will be offered face-to-face for students on UF's campus (Section 12409). For online students (Sections 12433 and 12434), all lectures will be recorded, and the videos posted on the course's canvas webpage. All students registered for this course will have access to the course lecture videos. **Class meetings will be on MWF during Period 8 (3:00 PM - 3:50 PM) in CSE building, room E112.**

Materials and Supply Fees: N/A

Textbook and Software

Textbook: No textbook is required for this course. Reading materials and class notes as PPT slides will be provided by the instructor through posting on CANVAS.

Software: The geochemical equilibrium model MINEQL+ will be used. The software will be provided by the instructor. Please note that all faculty, staff, and students at the University of Florida 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.

Course Schedule

MODULES	MODULE'S TITLES	LECTURE TOPICS
Module-1	Background Concepts	1. Origin and abundance of chemical elements 2. Earth's crust and distribution of the elements 3. Weathering and metal release from rocks
Module-2	Metals in Soils	1. Soil formation and soil types 2. Metals in soils
Module-3	Metals in Aquatic Systems	1. Metals in water and speciation 2. Redox chemistry of metals in aquatic systems 3. Sorption/desorption
Module-4	A Geochemical Equilibrium Modeling System for the speciation of metals	1. Basic Calculation 2. Performing a series of calculations 3. Surface adsorption modeling 4. Oxidation-Reduction 5. Solving real world problems
Module-5	Toxicity of Metals	1. Basic concepts of toxicology 2. Interactions metals / biological systems. 3. Mechanisms of toxicity and the identification of the binding sites of toxic metals in biochemical systems.
Module-6	Biogeochemistry of Selected Metals	1. Arsenic (As), Lead (Pb), Mercury (Hg), etc. 2. Remediation of metal contaminated systems

Attendance Policy, Class Expectations, and Make-Up Policy

Cell phones must be turned off or silenced at the beginning of class; use of cell phones for calls or messaging during class is prohibited. On-campus students are encouraged to attend all classes. History indicates that students who do not attend class do poorly on examinations and suffer the consequence of low grades. Make-up exams are only given for excused absences, which are consistent with university policies and would require appropriate documentation. A student may request a make-up exam if he/she cannot attend the scheduled exam for, say, medical reasons and can show proofs of such reasons (e.g. letter from a PCP or hospital). Overdue homework assignments will be penalized at a rate of **-50** points per day. For instance, a HW assignment due on 01/24/2020 and turned in on 01/25/2020 will be graded over 50, and not 100.

Evaluation of Grades

Assignments	Points per assignment	% Final Grade
Homework	100	100

Grading Policy

Percent	Grade	Grade Points
90 - 100	A	4.00
87 - 89	A-	3.67
83 - 86	B+	3.33
80 - 82	B	3.00
76 - 79	B-	2.67
73 - 75	C+	2.33
70 - 72	C	2.00
66 - 69	C-	1.67
63 - 65	D+	1.33
60 - 62	D	1.00
56 - 59	D-	0.67
<56	E	0.00

Students Requiring Accommodations

- Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. 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 <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

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 (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-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.

Commitment to a Safe and Inclusive Learning Environment

- The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.
- If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
 - a. Your academic advisor or Graduate Program Coordinator
 - b. Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
 - c. Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
 - d. Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

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: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

- Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.
- **Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
- **Sexual Discrimination, Harassment, Assault, or Violence**
- If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu
- **Sexual Assault Recovery Services (SARS)**
- Student Health Care Center, 392-1161.
- **University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

- **E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.
- **Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.
- **Library Support**, <http://cms.uflib.ufl.edu/ask>. 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. <https://teachingcenter.ufl.edu/>.
- **Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.
- **Student Complaints Campus:** https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
- **On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-proc>