

MATH FOR ENVIRONMENTAL PROFESSIONALS

SWS 6932 - 2 credits

Fall 2016

Chat sessions Thursdays 5:30-6:30 pm

INSTRUCTOR: Dr. Kanika S Inglett (Kanika@ufl.edu)

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OFFICE HOURS: By appointment only or by email. Questions can be sent via e-learning canvas email using the course website, I generally check the course website several times a day but please allow up to 24 hours for response. Please post all material related general questions on the discussion board.

COURSE OVERVIEW: This course is meant to be ‘refresher course’ that reviews the fundamental principles (of mathematics, chemistry, biology and physics) and calculations that are routinely encountered in environmental sciences. The coursework involves reviewing fundamental principles of quantifying physical (mass/ volume relationships, heat transfer), chemical (oxidation-reduction, buffer preparation, dilution calculations) and microbial properties (biomass, respiration, mineralization, kinetics) in soil and water environments and working through basic calculations that form the basis of all laboratory work. Students who are just beginning their experimental/lab work or graduate studies would greatly benefit from this course.

COURSE OBJECTIVES: To bring students up to speed in mathematics, chemistry, and physics with emphasis on those skills that are most relevant to graduate courses in environmental science including Soil and Water Science; To better prepare students for entry into graduate level courses which assume knowledge and competency in these particular skills as indicated by the course prerequisites.

COURSE FORMAT: Web-based lectures and one hour weekly discussion session. The course material will be released at a set schedule. You will have access to one unit at a time. At the beginning of each week, the instructor will assign the topic/slides to be studied over the period of that week. In order for you to remain on schedule, the study of this material must be completed during that week. Even though the entire module is released and available, I strongly recommend you limit yourself to the material assigned by the instructor so as to gain a reasonable understanding of the material. Associated to each module will be the reading material that may elucidate the material in the texts or slides.

The material for the course can be accessed at <http://elearning.ufl.edu/> . You will need your Gatorlink account and your password to login.

KSInglett

Page 1

FREQUENCY TAUGHT: Fall Term

DISCUSSION SESSION ATTENDANCE: Required.(Thursday 5:30-6:30 pm).

You are encouraged to attend every discussion session. Each one of you is allowed one no-questions-asked absence. Each subsequent unexcused absence will be penalized with a deduction of points from your final grade. Absences due to medical emergencies, academic, or athletic engagements, etc. that are properly documented will be excused. Additional information about UF's attendance policy can be found here: Attendance policy <http://handbook.a.ufl.edu/policies.aspx>

TEXTBOOK: *Math for Soil Scientists* by M.S. Coyne and J.A. Thompson. 2006. Thomson Delmar Learning. (Recommended).

INSTRUCTIONS FOR ON DISTANCE EDUCATION STUDENTS: This course is offered in a web-based environment; the format of which involves self-guided learning by systematically following an image and an accompanying image narrative. The course consists of 6 modules, an outline can be found in the course syllabus. Taking a course via distance education requires self discipline and rigorous adherence to the lecture schedule set up by the instructor. The following instructions should help with organizing the distance education, please read the instructions before proceeding to the first lecture.

TECHNOLOGY CHECKLIST: In order to successfully participate in distance education courses offered by the Soil and Water Science Department, it is the responsibility of each student to have access to a personal computer (or laptop), the Internet, and other equipment to maintain the functionality of peripherals (e.g. Functional microphone). For more help with e-learning the students need to review the information found at <https://kb.helpdesk.ufl.edu/FAQs/E-Learning>

GRADING SYSTEM:

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Points (%)	95-100	90-94.99	87-89.99	83-86.99	80-82.99	77-79.99	73-76.99	70-72.99	67-69.99	63-66.99	60-62.99	0-59.99

Associated to each module will be an assignment that must be completed. Assignments will include allotted readings/ short quizzes/ questions that are expected to be submitted in time. Timely submission (as indicated on the assignments) of the assignments is critical for proper grading and credit. Your understanding of the material will be tested with two exams during the semester Exam – will be time limited and will include calculations of data sets (provided by the

instructor) related to your study material. In order for us to achieve this, we will agree upon a specified time. The exam will be released and the completed exam will be expected back within a set timeframe. As indicated initially, the amount of interaction is also important. Attendance and participation during Discussion sessions is required. Special permission should be obtained in advance if the student is unable to attend the chat session.

ASSESSMENT

Assignments (related to each unit)	55%
Exams1	20%
Exam 2	20%
Attendance	5%

COURSE FEEDBACK: Students are expected to provide a feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>.

Evaluations are open the last two weeks of the semester. A notification will be sent to all students when the portal opens.

UNIVERSITY REQUIRED ANNOUNCEMENTS:

Academic Honesty: As a result of completing the registration form at the University of Florida, every student has signed the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University”.

UF Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual assault counseling; and
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

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 hold ourselves and our peers

to the highest standards of honesty and integrity.

TOPICAL OUTLINE:

Unit 1 THE BASICS

1. Basic Math Scientific notation Exponents and Logarithms
2. Significant Figures (reporting in scientific tables and calculations)
3. Metric and International Scientific units
4. Unit conversions (liquids, solids)
5. Making solutions and dilutions (normality, molarity, pH)

Unit 2: QUANTIFYING PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

6. Soil texture and surface area
7. Bulk density, particle density and porosity
8. Soil Organic matter content
9. Measurements of soil water (moisture content, field capacity)
10. Water and gas transport
11. Soil temperature, heat capacity and conductivity

Unit 3 PROBLEM SOLVING IN ENVIRONMENTAL BIOCHEMISTRY

12. pH buffers and buffering
13. Oxidation Reduction and Energetics
14. Kinetics
15. Stable and radioactive isotopes

Unit 4 PROBLEM SOLVING IN ENVIRONMENTAL BIOLOGY

16. Microbial growth yield and mortality
17. Microbial enumeration (microscopy)
18. Microbial biomass
19. Mineralization and Immobilization rates
20. Respiration and gas fluxes (in field and in lab)

Unit 5 PROBLEM SOLVING IN SOIL CHEMISTRY, FERTILITY, and MANAGEMENT (optional)

21. pH, Liming and Lime requirements
22. Cation and Anion exchange
23. Calculating fertilizer Application rates and nutrient availability
24. Potential Erosion
25. Waste management and bioremediation

Unit 6 DATA ANALYSIS AND SAMPLING

26. Descriptive statistics
27. Error analysis
28. Hypothesis testing and Inferential statistics
29. Sampling

Unit 7 PROBLEM SOLVING IN BIOGEOCHEMICAL PROCESSES (optional)

Calculations related to other biogeochemical processes that are routinely used in research.