Instructor: Dr. Jonathan Judy, Assistant Professor, Soil and Water Sciences Dept.
Office location: 2167 McCarty Hall A
Office hours: Please call or email for an appointment.
Course Prerequisites: SWS 3022 or SWS 5050 (or equivalent); General Chemistry (CHEM 2046 or equivalent).
Credit Hours: 3 credits
Delivery Method: Web, Fall semester every year
Enrollment Cap: 40

Online meetings /Chat sessions:
*Wednesdays 6-7 pm.* Chat dates and topics are listed on lecture schedule (in this syllabus). We will use Zoom video conference software for all chats. Invitations to chats will be sent via email.

Participation using a microphone and/or webcam is mandatory.

**First chat for Fall 2018 is Aug 22 @ 6 pm ET.**

Please note all chats are recorded and posted the following day under the “Chat” tab on main banner.

Course Overview:
The course will cover the basic principles of soil and water chemistry. The class will cover the fundamentals principles of the properties of soil components and soil reactions that affect plant growth and environmental quality.

Course Objectives:
In this course, we will describe the soil solid and solution phases, introduce the chemical principles necessary to examine the soil environment, and identify the chemical processes that occur in the soil environment and ultimately impact the fate and behavior of substances in soil and other natural water systems.

After finishing this class, you will be able to:
1. Discuss the importance of the soil solution phase in which almost all chemical reactions in the soil occur, and be able to use and understand applications of speciation models.
2. Identify the common primary and secondary minerals, and solids that compose soils; explain their characteristics and potential reactivity in the environment.
3. Distinguish between ion exchange, adsorption, and precipitation reactions.
4. Debate the importance of pH and reduction/oxidation (redox) status of a soil in dictating the aqueous speciation of an element, as well as reactivity, mobility, and toxicity; develop solubility and pH vs. Eh diagrams; and given the chemical and mineralogical properties of a soil determine which of these processes would dominate.
5. Characterize the chemistry, diagnosis, and reclamation of problematic soils like acid and alkaline soils.
Course Requirements: Students must have an e-mail account, Internet access, access to a computer that meets the University of Florida computer standards

Required Text: Soil Chemistry; Strawn, Bohn and O’Connor. 2015 (4th edition)

Course Web Site: Narrated lectures, handouts and assignments are posted on the class website on Canvas. Go to http://elearning.ufl.edu/, log on using your Gatorlink. You need to have a Gatorlink account http://www.gatorlink.ufl.edu/ to be able to log on to the class. Please note that E-learning needs Java to work properly. You can download Java from the same website.

Supplemental Reading Materials (Selected materials from other books posted on class website)

Students Responsibilities
Students are expected to study the assigned text sections and listen to narrated lectures prior to lecture coverage in class. Students are expected to actively participate in class chat discussions.

HW, Class Discussions and Exams:
This class has required HW, discussion posts, and exams as follows: 8 homeworks, 4 discussion posts, 11 quizzes and three on-line exams. Your final grade will be based on the cumulative score for the exams, homework assignments and discussion posts. Exams will feature additional, graduate student only questions.

Graduate students will also be required to complete a term project. The term project subject matter will be selected by the student in consultation with the instructor and agreed to by September 21. 10 points will be awarded for on-time submission of topics, 10 points for on-time submission of the outline, and 80 points for the completed project.

Course grades are determined by summing all scores, dividing by the maximum score possible and multiplying by 100: 100-92% = A, 91-90% = A-, 89-87% = B+, 86-82% = B, 81-79% = B-, 78-75% = C+, 74-70% = C, 69-65% = D+, 64-60% = D, <59% = E. See also UF policies at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Make-Up Work and Absences

Make up exams are rarely authorized and must be medically justified and authenticated.
Homework assignments will be assigned regularly and will be graded. A 10% per day lateness deduction will be assessed for any assignments (not just homework) turned in late. Work more than a week late will not be accepted.

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

### Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at [https://evaluations.ufl.edu](https://evaluations.ufl.edu). Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at [https://evaluations.ufl.edu/results](https://evaluations.ufl.edu/results).

### Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: [http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php](http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php).

### 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.

### Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom,
accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources:  
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

1. University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/
   - Counseling Services
   - Groups and Workshops
   - Outreach and Consultation
   - Self-Help Library
   - Training Programs
   - Community Provider Database

2. U Matter We Care, www.umatter.ufl.edu/

3. Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Student Complaints:  
Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See http://distance.ufl.edu/student-complaint-process/ for more details.
<table>
<thead>
<tr>
<th>Week(s)</th>
<th>Section 1: Introduction and Review</th>
<th>Readings</th>
<th>Chats</th>
<th>Assessments (Check due dates on Canvas)</th>
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</table>
| 1 Aug 23 | Definition of Soil Chemistry; Relation to Plant Growth & Environmental Quality | SBO Chapters 1 and 2  
Ch 1-2 Study Questions  
Review of chemical principles handout | Chat 1:  
Aug 22 6-7 PM  
Introduction and AV/Tech issues | Chapter 1 Quiz  
(8/27) |
| 2 & 3 Aug 30 & Sept 6 | Soil and Water Chemistry Part I: Soil Water Sampling; Composition of Soil Solution & Activity Concepts  
Soil and Water Chemistry Part II: Water and Ion Water Interactions; Chemical reactions | SBO Chapter 4  
Ch 4 Study Questions | Chat 2:  
Aug 29 6-7 PM  
Chat 3:  
Sep 5 6-7 PM | Chapter 2 Quiz  
(8/31)  
Discussion 1  
(Due 8/31)  
HW # 1  
(Due 9/1)  
Chapter 4 Quiz  
(9/7) |
Soil Solids Part II: Secondary minerals, Layer silicates, oxides & soil organic matter | SBO Chapters 6-9  
Ch 6-9 Study Questions | Chat 4:  
Sep 12 6-7 PM  
Chat 5:  
Sep 19 6-7 PM  
Soil solids and Exam 1 Questions | HW # 2  
(Due 9/14)  
Chapter 6 Quiz  
(9/14)  
Chapter 7 Quiz  
(9/19)  
Chapter 8 Quiz  
(9/21)  
Discussion 2  
(Due 9/21)  
Term Project Topics  
(Due 9/21)  
Chapter 9 Quiz  
(9/24) |
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<tr>
<th>Week(s)</th>
<th>Section 3: Soil Solid Phases</th>
<th>Readings</th>
<th>Chats</th>
<th>Assessments (Check due dates on Canvas)</th>
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<tr>
<td>7-9</td>
<td>Sorption Phenomena Part 1: Ion Retention and Cation Exchange&lt;br&gt;Sorption Phenomena Part 2: Cation Exchange Equations, Anion Exchange and Neutral Molecule Retention&lt;br&gt;Sorption Phenomena Part 3: DDL and Adsorption Isotherms</td>
<td>SBO Chapters 10-11&lt;br&gt;Ch 10-11 Study Questions</td>
<td>Chat 6: Sep 28 6-7 PM&lt;br&gt;Chat 7: Oct 10: 6-7 PM&lt;br&gt;Chat 8: Oct 17: 6-7 PM</td>
<td>HW # 3 (Due Sept. 28)&lt;br&gt;Exam # 1 Sep. 30- Oct 2&lt;sup&gt;nd&lt;/sup&gt;&lt;br&gt;Chapter 10 Quiz (10/5)&lt;br&gt;Chapter 11 Quiz (10/11)&lt;br&gt;HW # 4 (Due Oct. 12)&lt;br&gt;Term Project Outline (Due Oct. 19)</td>
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<tr>
<td>10 &amp; 11</td>
<td>Soil Acidity Part 1: Source, Classification and Al theory of soil acidity&lt;br&gt;Soil Acidity Part 2: Buffers, Lime requirement and hazards of soil acidification</td>
<td>SBO Chapter 12&lt;br&gt;Brady and Weil Chapter 9&lt;br&gt;Review tutorial on soil acidity calculations&lt;br&gt;Ch 12 Study Questions</td>
<td>Chat 9: Oct 24: 6-7 PM&lt;br&gt;Chat 10: Oct 31: 6-7 PM&lt;br&gt;Dr. Judy at SETAC Nov. 3-9 No chat Nov. 7</td>
<td>HW # 5 (Due Oct. 26)&lt;br&gt;Chapter 12 Quiz (10/29)&lt;br&gt;HW # 6 (Due Nov. 2)&lt;br&gt;Exam 2: Nov 4-6</td>
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<td>12</td>
<td>Salt Affected Soils Part 1: Sources of salinity and alkalinity, carbonate equilibria</td>
<td>SBO Chapter 13&lt;br&gt;Download handout on irrigation water quality</td>
<td>Chat 11: Nov. 14 6-7 PM</td>
<td>HW # 7 (Due Nov. 9)&lt;br&gt;Chapter 13 Quiz (Due Nov. 16)</td>
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<td>Week(s)</td>
<td>Section 7: Oxidation-Reduction Reactions</td>
<td>Readings</td>
<td>Chats</td>
<td>Assessments (Check due dates on Canvas)</td>
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<td>13 Nov. 29</td>
<td>Oxidation-Reduction Part 1: Definitions and thermodynamic relationships</td>
<td>SBO Chapter 5 &lt;br&gt;Lindsay Chapters 2 (pp 23-30), 10 and 11 (PDF posted)</td>
<td>Ch 5 Study Questions</td>
<td>No Chat Nov. 22 &lt;br&gt;Chat 12: Nov 28th &lt;br&gt;HW # 8 (Due Nov. 23) &lt;br&gt;Ch. 5 Quiz (Due Nov. 30) &lt;br&gt;Term Projects (Due Nov. 30) &lt;br&gt;Discussion 3 (Due Dec. 5)</td>
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<td>Classes END Dec. 5 &lt;br&gt;Reading Days: Dec. 6-7 Dec</td>
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<td>Exam 3: Dec 9-11</td>
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