Fundamentals in Soil Chemistry and Mineralogy

September 4 and September 11, 2013

Certified Soil Scientist Preparatory Short Course offered by the Soil Science Society of America

Primary Instructor: Dr. Sam Feagley
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Facilitator: Dr. Dawn R. Gibas, Licensed and Certified Soil Scientist
Soil Science Program Coordinator
Soil Science Society of America
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Fundamentals in Soil Chemistry and Mineralogy Description:

The chemistry of a soil is a reflection of the type of parent material that the soil formed in and as such can be distinguished on a basis of mineralogical structure and the inherent chemical characteristics and their reactions/interactions within the soil environment. Basic concepts of the soil chemical environment will be reviewed such as bonding strength, cation exchange capacity, oxidation/reduction and pH. Implications for management of soil chemistry will also be covered including laboratory and field techniques, fate and transport of chemicals in soils, as well as the issues associated with saline, sodic and saline-sodic soils.

This course is taught via distance learning, but the instructor will supplement lecture material with additional readings and practical examples to illustrate the concepts and provide practical examples of how the concepts are used in practice. This course is designed to complement the students existing knowledge of soil science and help the student understand the principles behind the Soil Science Performance Objectives, which define the practice of soil science.

Class Schedule/Time:
Orientation will be posted by August 19 for viewing on your own and the Soil Chemistry and Mineralogy portion of the course will be Wednesday September 4 and September 11 (two weeks); the course will conclude on Wednesday, September 11, 2013.

Class times will be 7:00 to 9:00 PM Eastern/ 6:00 to 8:00 PM Central/ 5:00 to 7:00 PM Mountain/ 4:00 to 6:00 PM Pacific.

Most class periods will last the full two hours with a 10 minute break halfway through. The software that is used for the course will allow students to enter questions that they would like the instructor to answer. If there is time at the end of the class, the instructor may use that time to answer questions, but all questions will be answered in writing and then posted on the course website.

To achieve the greatest benefit from this course, students will be expected to spend time attending all the classes, reading any needed supplemental materials, and completing the quizzes. The instructors may be contacted at any time via email with questions or comments.
Communications Requirements
The course is delivered live via the web using GoToMeeting software. All sessions are also recorded. An email address and high-speed internet access are required. GoToMeeting Systems Requirements:
http://support.citrixonline.com/GoToMeeting/help_files/GTM010003#What

Recommended Textbooks (Optional - to be purchased or obtained by the student)

Soil Science Fundamentals Exam – Performance Objectives
This document can be downloaded for free from the SSSA website:

The Nature and Properties of Soils (Brady and Weil; Pierson/Prentice Hall Publisher)
The current edition is the 14th edition, which can be found on Amazon.com for about $137.00 (new). There are also options to buy used textbooks or rent them from various vendors. You may use earlier editions of this text, but please be aware that some information may not be as up-to-date as the information in the latest edition and instructors may not be able to give you the pages for equivalent information in an earlier text.

Other Textbooks (supplemental materials)

You may choose from these books as needed for supplemental materials.

Soil Science Study Guide Book ($100.00)
This document may be obtained either in print format or by download from the SSSA website:
https://portal.sciencesocieties.org/Purchase/ProductDetail.aspx?Product_code=190f6ed6-66e3-df11-938b-0013210e308c Note: This document is slated to be updated and a new version available December 2013.

Environmental Soil Chemistry by D. Sparks, 2nd edition, available from Amazon.com and other vendors new, used, rent or Kindle.

Soil Chemistry by H. Bohn, B. McNeal, and G. O’Connor available at Amazon.com new for $130.00 or on Kindle for $99.00.

Soils and Environmental Quality, 3rd edition (Pierzynski, G.M., J.T. Sims, and G.F. Vance) The publisher is Taylor & Francis; the book can be found on Amazon.com for $87.00 (new) with decreased prices for used books or the Kindle edition.

Math for Soil Scientists (M.S. Coyne and J.A. Thompson, 2006)
The publisher is Thomson/Delmar Learning; found on Amazon.com for about $43.00.

Note: Instructor may also add readings as needed.

Student Directory Information
Student name, city/state/country, phone, and email will be included in a listing on the course website and will be available only to other Soil Science Fundamentals students and those administering the course. Students can opt out of this listing when registering for the course.

Use of Class Materials
Registrant agrees that the name indicated on the registration form is the sole individual
receiving the on-line instruction and the only person completing the on-line quizzes. Individuals found in violation of this policy will be subject to dismissal from this course, revocation of certification, and possible loss of privileges to participate in future offerings from the Soil Science Society of America.

The PowerPoint presentations, class recordings, quizzes, worksheets, and other materials developed specifically for this class are for the educational purposes and use of students registered for this class. Students are not to be copy, forward or share in any way with anyone for any other use without the permission of the Soil Science Society of America.

Grading
A ten question quiz will be offered weekly that covers the materials from the previous week, available for students to take on-line during their own time. Individual performance on weekly quizzes will be provided confidentially to students to give an indication of the mastery of various topics. No make-up quizzes will be offered. There will not be a final exam for this course, and grades will not be assigned. Students who complete both quizzes or accumulate at least 14 of the 20 quiz points (70%) can request a certificate of completion for the course. Missed quizzes will count as zero. Certified individuals seeking Continuing Education Units (CEUs) must achieve a passing score (at least 7 of 10) on a quiz to get credit for that particular session.

Quizzes will be posted on the class website by Friday each week and will be due the by the Tuesday following the next class (or 12 days later). Access to quizzes will close at 11:59 PM central time; you will need to have completed AND submitted the quiz by that time in order for it to be assigned a score. Print out your quizzes before you submit them for your reference and in case a score isn’t recorded to be able to show that you took it. Note: The system allows you to take the quizzes multiple times, but only your first score is counted.

Please make sure that you keep complete the quizzes! See class schedule (below) for availability and due dates of quizzes.

Class Web Site
Students registered for the course will have access to the class web site where the following will be posted:

- Lecture video recordings; audio with PowerPoint slides.
- PowerPoint slides in pdf format.
- Link to quizzes and answer keys to quizzes.

Access to the class web site will begin August 12 and end one month following the last class period; ending October 11, 2013.
Class Schedule: Topics, Reading, and Quizzes (subject to modification):

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<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Reading</th>
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<tbody>
<tr>
<td>Orientation</td>
<td>Introduction to Course and Logistics</td>
<td>No reading</td>
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<tr>
<td>Available on-line by August 19</td>
<td>(This session is not required, but is</td>
<td>required for this class</td>
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<tr>
<td></td>
<td>recommended if you have not taken an on-line course prior to this one.)</td>
<td>No quiz</td>
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<thead>
<tr>
<th>Week</th>
<th>Soil Chemistry and Mineralogy</th>
<th>Recommended Readings</th>
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<tbody>
<tr>
<td>September 4</td>
<td>Basic Concepts</td>
<td>Bohn, McNeil, O’Connor: 1-48, 68-203</td>
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<td></td>
<td>Solid Phase and Weathering</td>
<td>Brady and Weil: 31-75, 315-357, 499-519</td>
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<td></td>
<td>Ion Exchange</td>
<td>Quiz 1 available September 6</td>
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<td>September 11</td>
<td>Acidity</td>
<td>Bohn, McNeil, O’Connor: 209-409</td>
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<td></td>
<td>Oxidation-Reduction</td>
<td>Brady and Weil: 358-442</td>
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<td></td>
<td>Salt Affected Soils</td>
<td>Quiz 2 available September 13</td>
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Quiz Due Dates:
- Quiz 1: September 17
- Quiz 2: September 24

Instructor

Dr. Sam Feagley

Sam Feagley is currently a professor in the Soil and Crop Sciences Department at Texas A&M University. He was raised on a cotton and grain sorghum farm near Muleshoe, Texas. He graduated from Muleshoe High School in 1970. He attended Texas A&M where he received his BS in chemistry and MS in soil fertility and chemistry, and University of Missouri where he received his PhD in soil chemistry. He worked at Louisiana State University from 1979 to 1995 where he had a teaching/research position working with surface mine reclamation, remediation of saline/sodic soils, and treatment of sewage effluents using natural swamps as tertiary treatments. He returned to Texas A&M in February 1995 and now holds an Extension/teaching position as the State Soil Environmental Specialist and Professor. His Extension programing and research concentrates on nutrient management related to land application of animal wastes, composts, and biosolids, reclamation of saline and/or sodic soils, and reclamation of drastically altered lands. Teaching responsibilities include a graduate class in land reclamation in the fall semester and an undergraduate/graduate study abroad class to Brazil in the spring semester and introduction to soils class spring, summer and fall semesters. He has been awarded four teaching awards from Louisiana State University and three from Texas A&M University.
Dr. Feagley is a certified professional soil scientist (SSSA), certified nutrient management specialist (TX), and licensed geoscientist - soil scientist (TX). He is active in ASA and SSSA as Rapid Response Team from 2008 to present, A5 Chair in 2008, Agronomy Journal Associate Editor from 2002-2007, Council of Soil Science Examiners from 1997-2004, Emil Truog Soil Science Award Committee from 1993-1994, Membership Committee from 1993-2001 and Student Manuscript Committee from 1989-91, 1990 and 1991 - Chair. He was awarded the SSSA Irrometer Award in 2010 and ASA Fellow in 2012.

**Facilitator**

**Dr. Dawn Gibas**

Dr. Dawn Gibas joined the SSSA staff in July 2010 as the Soil Science Program Coordinator. Most recently she was faculty at The Ohio State University in the School of Environment and Natural Resources (SENR) where much of her research was located in Iceland studying successional landscapes, restoration and soil carbon. She still maintains an adjunct faculty position within SENR. Prior to her position at OSU, Dr. Gibas spent the majority of her career in environmental consulting and, for a shorter time, in county government. During her career she has, among other things, owned her own consulting business, managed the MN office of Tetra Tech, and traveled across the U.S. as part of her work. She has a B.S. in soil science from the University of Wisconsin, a M.S. in soil physics and a PhD in Forest Hydrology from the University of Minnesota. Dr. Gibas is both a licensed and certified soil scientist and has worked on issues surrounding the implementation of these programs since the early 1990s; Dr. Gibas has been involved with the Council of Soil Science Examiners since its inception and was the chair for several years. She also held a Governor appointed position as the Soil Science Board Member on the MN Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geoscience and Interior Design.

Briefly, some of the primary objectives of Dr. Gibas’s position with SSSA include overseeing the soil science licensing and certification programs for SSSA (including legislative issues), facilitating continuing education for soil scientists, and to overall help to grow the soil science profession by working with and facilitating communication between the private sector, government and academia.