Laboratory #1: Syllabus and Orientation (no quiz)

**PURPOSE:** *To introduce you to the course’s policies and expectations.*

**OBJECTIVES:**
1. Review the course syllabus provided below.
2. Outline the importance of the group soil in determining your course grade.
3. Become aware of the weekly quizzes in the course.
4. Establish groups for the semester.
5. Review the laboratory policies regarding cleanliness and safety.
6. Be apprised of how your course grade will be determined.

Laboratory Syllabus Supplement: Course Policies, Laboratory Requirements and Presentations

**Preparation for Laboratories:**
*Successful completion of laboratory exercises is dependent upon two factors:*

1. **Preparation before the lab.** Quite simply, this means read the laboratory manual **before** coming to the lab. Have a good idea as to what you will be doing and the sequence you will follow. **There will be a quiz at the beginning of each laboratory on the material (introduction, objectives, and procedures) for that day, to ensure that you are preparing for the lab. Additionally, there will be follow-up questions from the previous week’s lab.** Read the lab manual before you get to the lab; it would behoove you to read the material a day or two in advance and then skim over the laboratory material again, an hour or so before the beginning of the soils lab.

2. Proper laboratory technique. This is discussed below but can be summarized in two words: **organization and concentration.**

**Laboratory Technique:**
*Laboratory technique* refers to the operations and procedures required to successfully complete the desired analytical procedure within a reasonable time frame. To eliminate errors due to carelessness or misunderstanding of the objectives or procedures of the lab, it is absolutely essential to carefully prepare ahead of time. **Read the laboratory manual before you come to the lab** so that you are
familiar with the general approach to accomplish the required objectives. If you are unfamiliar with terminology presented in the manual, please discuss this ahead of time with the instructor or teaching assistant(s) so that you do not lose time or make unnecessary mistakes.

Once you proceed with the laboratory, concentrate on each step so that you do not have to repeat any of the procedures. Although this is a teaching laboratory, the habits and skills you develop now will unquestionably be of importance at later dates when you may have to be more precise in your techniques. If you develop good laboratory techniques now, it will be much easier to obtain more advanced skills later. **After completing the laboratory, clean up your work area and return all supplies and equipment to the appropriate storage location.** You will be working in groups of two to four. Each group is expected to wash/rinse off all glassware, countertops, etc. at the end of each laboratory.

**Laboratory Participation:**

1. You **must attend each laboratory** in order to submit the final lab report or problem set for grading. Unexcused absences will result in points being deducted from your laboratory grade. This lab only meets once each week so attendance is critical; you will **lose 5% off your point total for each unexcused absence**. You are responsible for collecting, organizing, and maintaining all data generated during the laboratory exercises (pages 5-7) and presenting the information in your **Group Soil Management Report** (pages 10-13). There will be a **quiz at the beginning of each lab**, except as otherwise noted, on the laboratories procedures that you will be covering that day and procedures and concepts from the previously lab. Be sure to read the lab manual before you come to class to be prepared for a quiz and to be able to complete the lab in the allotted time!

2. You are responsible for completing the **Study Questions** at the end of each laboratory exercise. This can be done in or out of class however must be finished before the next lab meeting. You may submit your questions via email to your TA or via the course website (e.g., Canvas).

3. The laboratory manuals will be turned in at the end of the semester for grading. This will entail checking documentation of the soil laboratory data collected over the course of the semester and reviewing completeness and comprehension of all study questions (via email or course website).

**Laboratory Safety:**

You must complete the **Occupational Health and Safety PLSC Right to Know Training available on-line.** Please complete the online exam, print out the certification, sign, and return the form to the Instructor or TA by the second lab meeting. You may also email your certificate to your TA.
https://delaware.bioraft.com/. The training you must complete is titled “Basic Right-To-Know Safety for Undergraduates in Lab Class Sections” on the BioRaft website. You must complete the exam even if you have done so for another class already. If you have difficulty accessing the online training, please notify the instructor or TA as soon as possible, and the appropriate steps will be made in order to complete your certification.

The Introduction to Soil Science Laboratory uses a range of substances throughout the semester. It is very important that you follow safe work practices in each laboratory. Material Safety Data Sheets (MSDS) are available upon request. This information is stored in a binder which can be found close to the laboratory door. Be aware of the location of the eye wash station, the shower, the first aid kit, the sharp box for any material that is sharp in nature (i.e. broken plastic or glass), the red emergency phone in the hallway, the fire extinguisher in the hallway, and the UD Occupational Health and Safety booklets in each of your laboratory drawers. Also, please adhere to the following laboratory rules:

1. No shorts, skirts, or open toed shoes in the laboratory.
2. Please dress appropriately for field trips (sneakers or hiking shoes, etc.).
3. Lab coats are suggested, however not required.
4. You must wear eye protection at all times when performing the laboratory exercises.
5. Always neatly label any equipment or laboratory supplies that contain substances.
6. Use the provided ethanol to wash the permanent marker labels from your test tubes and flasks.
7. Do not flush soil, or substances, down the drain. Appropriate containers will be provided.
8. No food or drink in the lab. You may leave food or drink outside in the hall.
9. Do not taste, lick, huff, snort, or waft any of the substances used in this laboratory!!!

**Group Laboratory Reports and PowerPoint Presentations:**
One laboratory report, per group, is required for this class (see next page). One PowerPoint presentation, per group, is required on your group report (see next page). To successfully prepare the report you must record your data from each laboratory procedure, and field trip, in your laboratory manual during each exercise. Do not write notes, numbers, calculations, etc. on scrap pieces of paper. **Keep all of your data and observations in your lab manual.** This will greatly facilitate the writing of your laboratory report which requires you to organize, summarize, and interpret the results of a series of laboratory experiments. You may electronically submit rough drafts of the report and
presentation to the TA for review. The TA will use the track changes function of Microsoft Word which will help you make corrections more easily. Help us help you.

In conclusion, you are responsible for a quiz at the beginning of lab each week (except as noted), a group final report at the end of semester, as well as a group PowerPoint presentation of the report, completion of the Study Questions at the end of each laboratory, and submission of your properly completed laboratory notebook at the end of the semester. The above assignments are designed to accompany your laboratory experience and facilitate the knowledge gained from this lab for future endeavors in your careers in plant and soil sciences, as well as reducing the pain and suffering required for the accurate completion of the final laboratory report. All tasks are career oriented and will materialize again in the future!!

**Final Report and PowerPoint Presentation:**

When developing management (nutrient, building, etc.) recommendations for any land use it is important to carefully and thoroughly characterize the properties of the soils at a given site. This process will provide information on the current status of the soil, relative to the characteristics needed for the intended use of the soil, and will serve as a guide for any corrective measures that must be taken prior to initiating the activities planned for the site. Standardized methods to characterize soils for the most important chemical, physical, and biological properties have been developed and published by the Soil Science Society of America (SSSA), other national organizations, national agencies such as the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA, NRCS) and academic institutions and associated extension programs (ex: University of Delaware Cooperative Extension, University of Maryland Extension, etc.). Management recommendations based on the results of soil analyses are more commonly developed at state or regional levels (ex: Delaware Department of Agriculture) and reflect differences not only in soil type, but also other parameters important to soil management such as climate, topography, hydrology, and types of plant communities present. As you will learn, management recommendations can also be the result of regulations established to protect local and regional water quality (ex: Chesapeake Bay).

The objective of your laboratory report is to prepare a soil management recommendation for the intended use of the soil you worked with throughout the semester, based on the soil analyses you perform and any other information that is available (e.g. soil survey manuals, crop/plant management information found in the Delaware Nutrient Management Handbook, textbooks, journal articles). You should include all of the data that you have obtained over the course of the semester, i.e. Your Soil’s Required Laboratory Data Sheet, which can be found on pages 3-7. The report should be concise and to the point - no less than 3 pages of text (double spaced, Times New Roman, 12 pt font)
accompanied by tables and/or figures properly illustrating your collected data and any tables, figures, or graphs that contain data you feel justify the recommendation you are making (tables and figures do NOT contribute to the minimum page count). For a passing grade on the report, it is essential that you follow all of the provided directions and that you fully justify and discuss your results from each laboratory experiment. You must make the correct connections and explain them in detail. The report must be typed using the following format:

1. A cover page, with an appropriate title, your names, date, course title, and course section number.

2. A clear and concise introduction that describes the purpose of the report. Where did you collect the soil and why did you choose this site? What is the current use of the soil? What would you like to use this soil for? Will the soil be used for personal or commercial farming? How large of an area does your soil encompass? Feel free to be very creative in this section. If you do not have a specific purpose for the soil you collected - you will not be establishing an actual garden or crop - create a story or situation in which you might one day grow the crop of your choice.

3. A neatly prepared data summary. This should be in tabular and graphical form. Any data that you feel are not necessary for your recommendation should be placed in tables in the Appendix of the report. You must include all your data somewhere in your report; discuss all chemical and physical characteristics of your soil, which can be found on pages 5-8. Footnote any pertinent information regarding the methods used to obtain the data. All graphs or charts must be prepared using a computer graphing program (ex: Microsoft Excel, Mac Numbers). Hand-drawn graphs and tables will not be accepted.

4. A detailed discussion section. This section should clearly discuss any soil and crop properties that were particularly important to you in developing your soil management recommendation. You should discuss the essential techniques important to the proper management of your crop. Include a discussion of how the properties of your soil impact management of the crop and what must/should be done to the soil to enhance its productivity for the intended crop. Any potential environmental considerations should also be covered. This section should be written in detail. Use all of your soil knowledge to show that you understand the linkages between soil physical and chemical properties, plant suitability and productivity, and environmental quality. This section will be heavily graded. It is important that you demonstrate the soil knowledge that you have gained over the semester and that you thoroughly understand the subject matter.

5. A conclusion section. This should briefly but clearly summarize the steps you think should be taken with respect to soil management (e.g., add organic material, add fertilizer, control soil erosion, etc.) for your intended crop.

6. An appendix. The appendix is for any useful data or information that you obtained over the course of the semester that you did not use in your report or recommendation.

Upon completion of your report, each group will prepare and jointly present a 10-minute PowerPoint
or PDF Presentation summarizing the main points of your written report to the rest of the class. This is to encourage discussion with and broaden perspectives for your classmates. Include the information outlined above, fully explaining your results and your suggested nutrient management recommendation. This should entail no less than 6 slides; discuss all the chemical and physical properties listed on pages 5-8. PowerPoint can be entertaining; have fun with it!!! The presentations will utilize the instructor’s or TA’s laptops. A USB drive will be provided for you to upload your presentation to on the day you present. You may also email the presentation to the instructor or TA prior to the start of class. The point of this lesson is to share your findings with the class and to demonstrate the knowledge that you have accumulated throughout the semester.

**Overall Laboratory Grade:**

There will be eight quizzes (with the lowest score dropped, therefore seven counting towards your grade), a required lab notebook/manual (with all data/calculations and study questions completed), and a final presentation with accompanying paper. Attendance will affect your grade!

- Lab Quizzes (7 @ ~7.1%) 50%
- Lab Notebook: Data/Calcs and Study Questions 30% (15% each)
- Group Presentation/Report 20% (10% each)
- *Attendance -5% for each unexcused absence
Laboratory #1: Syllabus and Orientation (no quiz)

Laboratory #2: The Soils Around Us (no quiz)

Laboratory #3: Soil Formation and Classification (quiz)

Laboratory #4: Physical Properties of Soils, Part 1 (quiz)

Laboratory #5: Physical Properties of Soils, Part 2 (Field Component) (quiz)

Laboratory #6: Soil Water (quiz)

Laboratory #7: Soil Descriptions (Field Trip) (no quiz)

Laboratory #8: Soil Colloids (quiz)

Laboratory #9: Soil Chemical Properties (quiz)

Laboratory #10: Soil Survey Reports and Crop Management (quiz)

Laboratory #11: Soil Organisms (quiz)

Laboratory #12: Careers, Nutrient Management (no quiz)

Laboratory #13: Presentations, Turn in Notebooks (no quiz)