

***Agriculture 315 Syllabus
Technical Soils Laboratory
Spring 2005***

M-W 2:30 - 4:40

Course Requirements and Information

Instructor: Dr. Gary Janicke - Room 5 A.B. Carter Bldg. Phone: 622-2231

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Office Hours: I will be available at times other than scheduled class periods. Please make an appointment just to ensure that we don't miss each other. Many labs require extensive setup time and I appreciate student involvement during the setup prior to class time. You will be rewarded.

Reference Materials:

The Laboratory Manual will be offered for sale during the first class period. This is a required text. The cost is minimal. The AGR 215 "*Principle of Soils*" textbook, Edward J. Plaster. *Soil Science and Management*, Third Edition. Delmar Publishing Co. will be used as reference material. This text is not required, access would be very useful. The laboratory manual will be the primary source of information for testing along with laboratory exercise results and procedures.

Agriculture Department Attendance Policy

Students enrolled in Agriculture Department classes are required to attend all scheduled class meetings. If a student has a legitimate reason to be absent (personal illness, critical illness, death within the immediate family or participation in a University approved activity), they are expected to discuss it with his instructor prior to an anticipated absence and make arrangements for any make-up work that must be done. Completion of make-up work is the responsibility of the student. The instructor will judge the validity of the reason for an absence.

In case of an emergency in which the above requirements cannot be met, the student should inform the instructor at the first opportunity after returning to the campus and should present adequate and documented reasons. In all cases, the student has the responsibility for requesting the opportunity to make up work. Absences in excess of 20 percent of a class will automatically result in a failing grade unless waived by the instructor and department chairman.

Students who have unexcused absences forfeit the right to do make-up work especially quizzes and exams given that day.

Enforcement of this policy is the responsibility of the instructor. Unexcused absences may be used as a factor in determining a grade for the course.

University Disability Statement

If there is any student in this class who is in need of academic accommodations and who is registered with the Office of Services for Students with Disabilities, please make an individual appointment with the course instructor to discuss accommodations. Upon individual request, this syllabus can be made available in alternative forms. If any student who is not registered with the Office of Services for Students with Disabilities has need of academic accommodations, please contact the Office directly either in person on the third floor of the Student Services Building or by telephone at 622-1500.

Business and Technology Skills Conference

Mark on your calendar APRIL 1, 2005 for the annual Skills Conference. This a required conference for all Agriculture Students. Be there or be

Evaluation:

The final grade for the course will be determined according to the following:

Final Exam - Comprehensive (4/25/05)	100 points
Laboratory Assignments & Quizzes	559 points
Semester Project	<u>100 points</u>
	759points

Grading:

The final letter grade will be based on a percentage of the semester total as follows:

90% = A 80% = B 70% = C 60% = D Below 60% = F

Exams will be primarily short answer and completion with some short essay questions. ***As you will note the majority of the grade will be derived from the laboratory exercises. All collected laboratory and field assignments will be reduced by 10% after the first hour and 25% of the total possible points for each class period late until the graded assignment has been returned, after which they will not be accepted. Also due to the nature of this course, laboratories can not be repeated for the convenience of the students, however, University excuses and physician excuses will be allowed as substitute assignments.*** The reasoning for this policy is fairness for all students in this course.

Personal Note

I am personally charged about this course. Laboratory and especially field work is my personal favorite so I hope this course will be as fun for you all it will be for me. Come to class charged and prepared for each exercise so that the laboratory will run as smooth as possible.

TOPIC ONE - PHYSICAL PROPERTIES

- Jan 10 - Syllabus; Ex.1 and Discuss Individual Exercises (**Review Questions 34 pts**)
Jan 12 - Ex. 2; Soil Testing; - **Collect samples for your soil analysis laboratories in topic 2**
(They must be in the oven drying by (20pts)
Jan 17 - *** HOLIDAY***** Dr. Martin Luther King**
Jan 19 - Ex. 3; Feel Texture Analysis **** **Quiz 1 for Ex 1 & 2 (15 pts)**
Jan 24 - Ex. 3; Lab Texture Analysis; Turn in Results (**20 pts**)
Jan 26 - Ex. 4; Db, Dp, PS Turn in Calculations (**20 pts**)
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TOPIC TWO - CHEMICAL PROPERTIES

- Jan 31 - Complete Laboratories 1 thru 4 then **Review for Topic One Quiz**
Feb 2 - **TOPIC ONE Quiz (Ex. 2,3, and 4) (30 pts) Ex. 2-4**
Feb 7 - Ex. 5; Soil pH - Turn in results. (**20 pts**)
Feb 9 - Ex. 6; Liming - Calculations (**20 pts**)
Feb 14 - Continue Liming Exercise (**Lime Recommendations 20 pts**)
Feb 16 - Ex. 7; Begin Fertilizer Response Experiment (**Report 30 pts. Due March 12**)
Feb 21 *** HOLIDAY***** Presidents Day**
Feb 23 - Ex. 8; Soil Colloids and CEC (**20 pts**)
Feb 28 - Ex. 9; Chemical Fertilizers **Questions (20 pts) Problems (20 pts)**
Mar 2 - Ex.10; Organic Fertilizers (**20 pts**)
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MARCH 7 - 11 SPRING BREAK YAHOOOOOOOOOOO!!!!!!!!!!!!

- Mar 14 - Ex.11; Soil Fertility (**20 pts**); Review Over Exercises 5, 6, 8, 9, 10 and 11 for Quiz #2.
Mar 16 - Complete Ex. 11 - Recommendations **TOPIC TWO QUIZ (50 points)**
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TOPIC THREE - SOIL WATER AND WATER MOVEMENT IN SOIL

- Mar 21 - Ex. 12 and 13; Soil Water - **Problems (20 pts)**
Mar 23 - Ex.14; Water Movement and Water Holding Capacity; Results and questions (**20 pts**)
Fertilizer Response Reports Due
Mar 28 - Ex. 15; Field Study (**Questions 20 pts**)
Mar 30 - Ex. 16; Soil Survey; **Turn in Question Sheet (20 pts)**
Apr 4 thru Apr 11 - Ex.17; Surveying; Turn in Map (**30 pts**) **Review for Topic Three Quiz**
Apr 13 - **Collect soil samples from Meadowbrook Farm, samples must be in the oven by (4/13) and labeled with the latitude and longitude for the April 25th Presentation**
*******TOPIC THREE QUIZ (50 points)*******
Apr 18 thru 20th Laboratory and computer work on semester projects
Apr 25 - **Class presentation of the Semester Projects from the Stateland Plots (100 pts)and Review for the Final Exam**
April 27 *** FINAL EXAM (100 Points) Comprehensive *******

LABORATORY SET UP AND CLEAN UP - 20 PTS

*******All Laboratory Exercises are subject to change dependant on weather conditions*******

SEMESTER PROJECT
(100 PTS)

*This class will collect samples at the earliest possible date on Meadowbrook Farm. Your semester project will be to complete a thorough evaluation of a sample. You must choose a partner and work together on this project. The results must be presented during the **April 25th** class period.*

Determine:

- 1. Plant production - determine plant production using one square foot frames (subplots). You must evaluate your subplots for production five times during growth starting on March 13 and ending one week prior to the presentation. (DM)*
- 2. Potential Soil Water Holding Capability*
- 3. Texture by feel*
- 4. Texture (Laboratory Method)*
- 5. Bulk Density*
- 6. Particle Density*
- 7. Pore Space*
- 8. Nitrate Nitrogen content per acre*
- 9. Phosphorus content per acre*
- 10. Potassium content per acre*
- 11. Organic Matter Content (%)*

Each group will collect all the information on the experiment for presentation using graphing of the data, when appropriate, for each factor that relates to dry matter production and then summarize the results in text form. Scoring will be based on Plant and Soil Analysis (20%), Timeliness (20%), Sample Data Presentation {Depiction of your data in graph form must be handed in to the instructor at the presentation} (30%) and Data Presentation {Experimental data must be presented to the class in a power point presentation with graphs on April 25th} (30%). Each member of the two person team will be evaluated separately for their contribution to the project.

Laboratory Exercise #1 Worksheet (34 pts) - Name _____

1. List the five soil forming factors and their effect on soil formation.

A. _____

B. _____

C. _____

D. _____

E. _____

2. Which factors affect:

a. Permeation - _____

b. Residue formation and content - _____

c. Dept of colloidal profile development - _____

d. Gravitation of ions - _____

e. Development of lacustrine, eolian, and colluvial materials _____

3. Elements of the silicate clays _____

4. Composition of organic materials _____

5. Soil porosity _____

6. Moh's scale _____

7. Typical parent materials of the outer bluegrass region of the Cincinnati
Dome formation. _____

8. Effect of the these parent materials on soil formation. _____

9. What is the effect of water and rock on soil formation? _____

10. How does residual soil formation differ from alluvial? _____

11. How does glacial soil formation differ from loessal? _____

12. How does colluvial soil differ from adobe? _____

13. How does organic soil differ from humic soil? _____

14. What are the differences between the Faywood soil and the Kickapoo soil series? _____

15. List three ways that you could contact the instructor if you have a question.

1. _____ 3. _____

2. _____

16. What are your career plans? (3) _____

17. How can I help you achieve you plan? (2) _____

18. What are you expectations of the course. (2) _____

Laboratory Exercise #5 - Questions and calculations

1. Determine the amount of Fertilizer do you need to supply to your sample?

Hint:
$$\frac{20 \text{ grams soil}}{\text{Sample}} \times \frac{100 \# \text{ fert.}}{\# \text{ Nutrient}} \times \frac{\# \text{ Nutrient}}{\text{Acre}} \times \frac{\text{Acre}}{2,000,000 \# \text{ soil}} = \frac{\text{Grams Fert}}{\text{Sample}}$$

2. Determine the amount of Nutrient/Acre you are supplying to the soil.

_____ $\frac{\# \text{ Nutrient}}{\text{Acre}}$

pH Calculation

The objective of this exercise is to learn the method of lime recommendation determination. Once pH is determined, the AGR-1 bulletin attached to back of your laboratory book will help you to determine lime recommendations.

In this exercise work with the bulletin to practice liming recommendation. Once you feel comfortable with the bulletin, work with the problem set to determine; FF, ECCE, cost determinations, and application recommendation.

Your next quiz will be based on these determinations. Do not leave the laboratory without a solid ability at determining these factors.

The objective of this laboratory experiment is to recognize visual nutrient deficiency symptoms. An extra plus will be the experience of mixing nutrient solutions.

The nutrient solutions will be mixed from the following table of stock solutions. What are stock solutions?

Table 1. Composition of various water based stock solutions to promote a nutrient deficiency.

ml. Of stock solutions per liter of D ₂ O											
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	
Complete	5	2	5	1	10	5	2	200	1	1	
- Ca		2	5	1					1	1	
- Mg	4		6	1		3			1	1	
- K	5	2			10				1	1	
- N		2			10	5		200	1	1	
- P	4	2	6						1	1	
- S	4		6	1			2		1	1	
- Trace elements	5	2	5	1					1		
-Fe	5	5	2	1						1	

** After four weeks evaluate the deficiency symptoms and prepare a small table to show the results. On the table show the difference between your results and the results as they should be. Research a reference to determine the expected results.

TOPIC #3

SOIL

WATER

PROPERTIES

SPRING 2005

LEACHING EXERCISE

<i>GROUP #</i>	<i>FERTILIZER</i>	<i>WATER pH</i>	<i>CLAY pH</i>	<i>SAND pH</i>
<i>1</i>				

<i>2</i>				
<i>3</i>				
<i>4</i>				
<i>5</i>				
<i>6</i>				
<i>7</i>				
<i>8</i>				
<i>9</i>				
<i>10</i>				
<i>11</i>				
<i>12</i>				

SUMMATION:

Questions:

1. How will this affect ground water? _____

2. How will this affect surface water? _____