

Group research projects Due May 7 and 8

Overview:

- Conduct a group research project comparing two soils at Whitman College
- Present your results to the class on May 7 and 8.

Your grade will be based on: a brief *group presentation* of your results, the *supporting materials* (graphs, etc) that you use to demonstrate your conclusions, and photos of team members doing parts of the project.

Students will work in groups of four or five students on a mini-research project at two locations on Whitman campus. The projects will all be related, so that the individual group projects will hopefully be aspects of a larger picture. The two study sites will be (1) the Whitman Organic Garden (I'll hereafter use the abbreviation WOG, because it is fun to say) and (2) a soil behind the Glover Alston Center (GAC, for the same reason).

1 Choose a group project

The projects will all compare the soils of the garden beds at WOG, which are cultivated and receive regular additions of composted organic matter, with the soils at GAC which are in some ways less disturbed (although far from undisturbed). Each group will choose a particular property to analyze, to see if there are any interesting differences between the two sites. For each project, the question we are interested in is: "what are the differences in [insert project title here] between the WOG and GAC soils?" The individual projects will be:

<i>Project</i>	<i>Protocol</i>	<i>Notes</i>
Soil texture and grain size	Online	Sed-strat is good experience
Soil organic carbon concentrations	Nelson & Sommers (1996)	Uses muffle furnace
Concentrations of heavy elements	See me	Uses the portable XRF
Soil microarthropods	Online	For Bio-oriented
Earthworms	Online	For Bio-oriented
Cation exchange capacity	Online	Chem dept. spectrometer
Plant-available water	Online	
Clay mineralogy on the XRD	See me	On the cutting edge!
Soil micromorphology	Josephs (2003)	Should have had Min-Pet

You will need to coordinate with the rest of the class to develop a team. You may work with whomever you wish, but there will be a maximum of five students per project. You may coordinate with classmates however you wish. One option is the class email:

GEOL_410_A_S12@cleo.whitman.edu

Once you have gotten a group together, be sure to announce it to the rest of the class via this email address so that we don't have multiple groups doing the same project.

2 Prepare a plan of action

After you are in a group with a project, the next step is to figure out how to make the measurements you need in order to answer your question. Here is what you need to do:

1. Read the instructions about how to do your project. The "protocol" column in the table above describes where the instructions are located. For those projects labeled "Online" the protocols can be found at <http://nickbader.whitman.edu/research/protocols>. For the others, the readings are posted on CLEO. For several experiments, the protocols are too new to post or require a meeting with me.
2. As a group, *schedule a meeting with me* to talk about your plan of action. We'll make sure you're on the right track and ready to go. To make sure that groups have as much time to work as possible, you should have scheduled a meeting with me by **Friday March 30**. Have a look at <http://nickbader.whitman.edu/home/findme> to see when I might be available.

3 Get your hands dirty

Once you understand what you need to do, all that remains is to get the group together to do some research! I will leave the details of how the work should be divided among the group participants up to you. However, try to be fair and involve each group member in every aspect as much as you can. Many analyses go much faster and are more fun if several people work together.

Warning: don't underestimate the amount of time required for this step! Lab work almost always requires more time than you expect, so plan accordingly. In particular, read the protocols carefully ahead of time to find out how much time to budget. For example, if you are using air-dried soils, you will need to let them dry for five days.

For sampling at the WOG, remember that it is a working garden! Don't just tromp over and start digging. Lisa Beneman is the student currently managing the garden; contact her to find out where it is OK to dig. Lisa's email is benemalm@whitman.edu.

A picture is worth a thousand words! It is a good idea to take photos of you and your teammates doing the analysis. These photos will be useful later when you are giving your presentations. In fact, these photos will be part of your project grade! You may borrow a camera from me if you don't have one. I will use your photographs to improve the protocol section on the website.

4 Interpret your results

Once you have done your research, the next step is to figure out what your results mean. Each project may have a different method of analysis. To figure out the implications of your work, you should *schedule a second meeting with me* at this stage. We will discuss what your results mean, how to test for significance, and how you might present your results to the class.

5 Presentations

Groups will briefly present their results to the class on **May 7 and 8** (the last days of class). Here is a checklist outlining what I expect to see in a presentation. I will use these criteria to grade your presentations, so heed them well!

- Your presentation should be brief. We only will have time for presentations if they are kept to ten minutes each. Note that it is difficult to make a sensible presentation that is this short. You will have to decide what information is pertinent and what is not, and you will have to practice with the group to make sure that you are polished and organized.
- Your presentation should be logically organized and to-the-point.
- Everyone in the group should get a chance to speak.
- Enough background information should be provided that the class can understand your topic.
- Your presentation should include supporting materials, like graphs, that illustrate your results.
- Your presentation should demonstrate that you understand your topic and results.
- Your conclusions should be warranted by the data you have. Not everyone will find significant differences between the two plots; that is OK!