**Course Name**: ST Soil Analysis – Laboratory

**Course Number**: SOIL 599

**Course Credits**: 2

**Faculty**: Markus Kleber, Shannon Andrews, David D. Myrold

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**Course Location**: Central Analytical Laboratory, Agriculture and Life Science Building, Room 3079 and 3096, Oregon State University Campus, Corvallis OR 97331

**Course Catalog Description**:

 Provide the theoretical background as well as practical experience needed to plan, select, execute, and interpret soil chemical and physical analyses such as those typically used for nutrient management recommendations. Individual and group activities; involves classroom presentations as well as hands-on work in a teaching laboratory. Samples processed are those collected in the course of preceding Field Course SOIL 512. Duration five (5) full work days.

**Pre-requisites**: SOIL 205 or equivalent and SOIL 599 St/Soil Analysis - Field. Successful completion of EH&S Laboratory Safety Training is required for admittance.

**Student Learning Outcomes:**

|  |  |
| --- | --- |
| *Knowledge* | * Recognize and identify all analytical equipment, laboratory tools and chemicals needed to execute a soil analysis for nutrient recommendations
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| *Comprehension* | * Select extraction method appropriate for the question/problem at hand
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| *Application* | * Operate minor equipment safely while generating robust data
* Practice manual skills such as dilution of standards
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| *Analysis* | * Categorize soil samples according to soil type specific analytical challenges
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| *Synthesis* | * Formulate a statement of soil fertility status based on data collected
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| *Evaluation* | * Interpret the meaning of analytical data considering the geographical and agronomical context for a given sample
* Assess consequences of projected land use for sustainability
* Select appropriate laboratory analyses in response to practical problem
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**Course Content:**

This course consists of a theoretical and applied methods of soil laboratory analysis. It will extend from Monday to Friday from 8:00 to 5:00 daily. The course addresses 5 major topics; nutrient concentration, controls on nutrient availability, texture, biological activity, and data interpretation. Each major topic will be presented in multiple sections using a mix of lecture based and experiential formats. Participants will be divided into small groups of individuals to assure satisfactory depth of instructor-student interaction.

Students will have the opportunity to practice lab procedures for the following soil specific analytical topics:

Soil nutrients: practice how to extract exchangeable nutrient elements, understand relationship between extraction method chosen and result obtained

Controls on nutrient availability (pH, EC, CEC): measure the concentration of protons and cations in the soil and learn how to drive this concentration into a predetermined range desirable for specified management goals

Soil texture: determine fundamental properties of the mineral matrix (the relative proportions of clay, silt and sand sized particles, including inference regarding pore size distribution, surface area and mineral surface reactivity)

Soil organic matter and turnover: measure abundance and assess quality of organic materials in soil (C, N and S elemental analysis) as well as the rate of decomposition by the microbial community

Data interpretation: practice the transformation raw data into meaningful indicators in order to make inferences related to soil management decision

**Evaluation of Student Performance:**

Student performance will be evaluated through three instruments. For each topical area, a quiz will be given at the end of the day. Quizzes will measure extent to which procedures, regulations, and practical advice are understood.

Each student will turn in their laboratory notebook at the end of the course. Thoroughness will be measured by means of a checklist of learning outcomes given to the students at the beginning of the course. Accuracy and neatness will also be assessed with the intent that this notebook can be used as a resource for future work.

Each student will be assigned one set of samples and a sample-related soil management question on the first day of class. Students will develop a data report for the respective sample, and provide an interpretation of the data with regard to the assigned soil management issue. By means of a written report, students will demonstrate problem recognition and the ability to derive adequate recommendations for sustainable improvement of a given problem.

Grade Distribution:

|  |  |  |  |
| --- | --- | --- | --- |
| *Item* | *Points assigned*  | *Grade* | *Points* |
| *Distribution* |
|  |  |  |  |
| Quiz (5) | 30 (6 pts each) | A | > 89 |
| Laboratory Notebook | 40 | B | 80 – 89 |
| Data Report and interpretation | 30 | C | 70 – 79 |
|  | 100 points total | D | 55 – 69 |
|   |   | F | < 55 |

Up to 20 bonus points (additional to the above) will be available for reflective notes written at the end of the day in the laboratory notebook. An “ah-ha” moment or insightful idea of how the information could be applied to their own research will earn points.

**Learning Resources:**

1. Compilation of standard operating procedures to be followed in this class – will be printed and provided to students
2. A variety of selected OSU Extension Service Publications available on Canvas
3. Selected methodological papers available on Canvas
4. Gavlak, R. G., Horneck, D. A. and R. O. Miller. 2005. Plant, Soil and Water Reference Methods for the Western Region, 3rd Edition. WREP 125.
5. Kellogg Soil Survey Laboratory Methods Manual Soil Survey Investigations Report No. 42 Version 5.0
 Issued 2014



**Link to Statement of Expectations for Student Conduct:** <http://studentlife.oregonstate.edu/studentconduct>

**Diversity Statement:**

*The College of Agricultural Sciences strives to create an affirming climate for all students including underrepresented and marginalized individuals and groups. Diversity encompasses differences in age, color, ethnicity, national origin, gender, physical or mental ability, religion, socioeconomic background, veteran status, sexual orientation, and marginalized groups. We believe diversity is the synergy, connection, acceptance, and mutual learning fostered by the interaction of different human characteristics.*

**Religious Holiday Statement:**

*Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.*

**Disability Access Services DAS Statement:**

*Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at* [*http://ds.oregonstate.edu*](http://ds.oregonstate.edu)*. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.*