**Course Name**: ST/ Soil Analysis – Field

**Course Number**: SOIL 599

**Course Credits**: 1

**Faculty**: Shannon Andrews, Markus Kleber

**Contact Info**: [markus.kleber@oregonstate.edu](mailto:markus.kleber@oregonstate.edu); phone: 541-737-5718

**Course Location**: Field trip visiting four OSU research centers; Corvallis - Horticultural Vegetable Farm, Aurora - North Willamette Research Extension Center, Madras - Central Oregon Agricultural Research Center, Willamette National Forest - HJ Andrews Experimental Forest.

**Course Catalog Description**:

This is a one-week intensive field course for graduate students whose work will involve soil analyses. Students will be taught a systematic approach to on-site soil assessment including landscape and environmental impacts, soil pit characterization, agricultural site assessment, appropriate experimental designs, and measurements they can take in the field. The goal of the course is for the students to have a thorough understanding of the place their samples originate in order to more fully understand the results of laboratory analyses and the considerations that should be taken when studying soil.

**Pre-requisites**: SOIL 205 or equivalent. Successful completion of EH&S Field Safety Planning worksheet is required.

**Student Learning Outcomes:**

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| --- | --- |
| *Knowledge* | * Methods and application of various soil field measurements and assessments |
| *Comprehension* | * Rational behind methods used in soil field measurements |
| *Application* | * Practice appropriate soil field measurements * Practice on-site soil suitability assessment |
| *Analysis* | * Compare soil management challenges and experimental considerations between soil types and ecoregions |
| *Synthesis* | * Develop sampling plan for specific site considering goals |
| *Evaluation* | * Interpret field data * Predict outcome of management activities * Select appropriate laboratory analyses in support of on site assessment |

**Course Content:**

This course will provide students with the hands on experience to perform a soil site assessment including; landscape and environmental analysis, soil pit characterization, agricultural productivity, experimental designs needed for specific questions, and measurements that can be taken in the field. Students will practice techniques to measure soil parameters in the field in order to more fully understand the results of laboratory analyses generated. Emphasis will be placed on understanding the physical location and management practices that impact the potential to use the site in a suitable fashion. Students will learn how to use field evidence to determine appropriate follow up measurements that must be performed in the laboratory (laboratory work will be addressed in a separate class, SOIL 599). Through this they will practice proper collection of soil, as well as samples from other ecosystem components that are directly related to soil, such as gases, water, and plants. Special attention will be paid to assessing the landscape where the samples developed. Site assessment characterization among and between sites will demonstrate the spatial variability that must be taken into consideration in the design of field work.

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| *Specific topics to be covered during the course will include*  Landscape and environmental components: landform identification, landform and land position impacts, geologic impacts, climate impacts, reading a topographical map, and analysis of a soil survey.  Soil pit characterization: pit management, texture, structure, boundaries, color, moisture estimation, water holding capacity, pedogenic processes, root restriction, limitations to plant growth.  Agronomic site assessment: nutrient deficiencies, water barriers, biological activity, appropriate crop selection, management impacts, disease pressure, and percent cover.  Experimental design: field trial design, sampling protocols, sampling for statistical power, temporal variation, and spatial variation.  Field measurements: soil moisture sampling, plant biomass estimates, bulk density, compaction, use of various soil sampling devices, chemical field analysis, and physical characterization. |

**Evaluation of Student Performance:**

Student performance will be evaluated through three instruments.

1. A quiz consisting of 20 questions will be given at the end of the week and is intended to measure understanding of basic facts as well as the extent to which content has been learned.
2. Through an essay between 500-1000 words, students will prepare a detailed explanation of the field work they need to conduct in order to have a meaningful dataset relevant to their own specific research question. This essay should include a theoretical explanation for the chosen measurements related to each of the five main topics taught in the class. If field work has already been conducted, students can write the essay with regard to what they would have done if they could start again.
3. Students will be expected to keep a detailed and thorough field notebook. A list of items that must be included will be given to the students on the first day of class and thoroughness will be measured from that checklist. Neatness and accuracy will also be evaluated so that students can use the notebook as a resource in their research path.

Grade Distribution:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Item* | *Points assigned* | *Due Date* | *Grade* | *Points* |
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|  |  |  |  |  |
| Quiz | 30 | 7/29/16 | A | > 89 |
| Field Notebook | 40 | 8/1/16 | B | 80 – 89 |
| Essay | 30 | 8/12/16 | C | 70 – 79 |
|  |  |  | D | 55 – 69 |
|  |  |  | F | < 55 |

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

**Field Trip Schedule:**

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| --- | --- | --- |
| **Day/Time** | **Location** | **General Task** |
| **Monday** |  |  |
| 8:00 | Meet in ALS 3096 | Course overview |
| 8:45 | Load up | Driving |
| 9:00 | Org Growers Club at Veg Farm | Landscape components and spatial orientation |
| 9:30 | Org Growers Pits | Pit Characterization |
| 11:15 | Org Growers Club at Veg Farm | Agronomic site assessment |
| 12:00 | Lunch Room Veg Farm | Lunch |
| 1:00 | Veg Farm | Experimental design and soil variability |
| 3:30 | Org Growers Pits | Field Measurements |
| 5:00 | Drive back to ALS |  |
| 5:15 | ALS 3096 | Debrief |
| 5:45 | Adjourn |  |
|  |  |  |
| **Tuesday** | **Location** | **General Task** |
| 7:45 | ALS Loading Dock | Meet and pack up |
| 8:00 | Depart | Driving to Rogue |
| 8:30 | Rogue Farm | Land History of Willamette Valley |
| 9:15 | Load Up | Driving to Aurora |
| 10:15 | NWREC Aurora | Landscape Analysis |
| 10:30 | NWREC Aurora | Pit Digging and Characterization |
| 12:00 | NWREC Aurora | Lunch |
| 1:00 | NWREC Aurora | Agronomic Site Assessment |
| 3:00 | NWREC Aurora | Experiment design and soil variability |
| 3:50 | NWREC Aurora | Field Measurements |
| 5:00 | NWREC Aurora | Debrief |
| 5:30 | Load Up | Driving to Clear Lake |
| 7:00 | Clear Lake Campground | Camp Set Up and Dinner |
|  |  |  |
| **Wednesday** | **Location** | **General Task** |
| 7:00 | Clear Lake Campground | Camp clean up and Breakfast |
| 8:00 | Load Up | Driving to Madras |
| 9:00 | COARC Madras | Landscape Components and Analysis |
| 9:30 | COARC Madras | Pit Digging and Characterization |
| 12:00 | COARC Madras | Lunch |
| 1:00 | COARC Madras | Agronomic Site Assessment |
| 2:30 | COARC Madras | Experimental design and soil variability |
| 3:15 | COARC Madras | Field Measurements |
| 4:00 | Load Up | Drive to Smith Rock |
| 4:30 | Smith Rock State Park | Geologic features of Central Oregon |
| 5:30 | Load Up | Drive to HJ Andrews |
| 7:30 | HJ Andrews Lookout Camp | Set up Camp and Dinner |
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| **Thursday** | **Location** | **General Task** |
| 8:00 | HJ Andrews Lookout Camp | Breakfast |
| 9:00 | Load Up | Drive to Doug Fir Red Alder Plots |
| 9:15 | DF RA Plots | Landscape Components and Analysis |
| 10:30 | DF RA Plots | Pit Digging and Characterization |
| 12:00 | Site with a good view | Lunch |
| 1:30 | DF RA Plots | Forestry/Land use potential |
| 2:15 | DF RA Plots | Experimental Design |
| 3:00 | DF RA Plots | Field Measurements |
| 4:00 | Load Up | Drive to another location with maps |
| 4:15 | Unknown location | Mapping exercise |
| 5:15 | Load Up | Drive back to camp |
| 5:30 | Main camp gazebo | Debrief |
|  |  |  |
| **Friday** | **Location** | **General Task** |
| 7:30 | HJ Lookout camp | Breakfast |
| 8:00 | Watershed 1 pits | Landscape and pit characterization |
| 11:00 | HJ Andrews Main Camp | Debrief |
| 12:00 | HJ Andrews Main Camp | Lunch and Pack |
| 1:00 | Load Up | Drive to Corvallis |
| 2:00 | Road Side Water Attraction | Swimming etc. |
| 3:45 | Arrive at Corvallis | Unload equipment |
| 4:00 | ALS 3079 | Process Samples - weigh and dry |
| 5:00 | Adjourn |  |

**Learning Resources:**

1. Documents loaded to Canvas
2. Guidelines for soil description, Fourth Edition, FAO, Rome 2006 and
3. Field Book for Describing and Sampling Soils, Version 2.0, National Soil Survey Center, USDA, Nebraska

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

**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.*