ENR5265 Syllabus for Autumn 2012 Semester

Course Title:
Characterization of Soil in the Field and Laboratory

Time: Wednesdays and Fridays from 11:10 AM to 12:30 PM
Room 382, Kottman Hall

ENR5265 is undergraduate/graduate course specifically designed to teach basic principles of soil, ecological or environmental sampling. It provides an overview of theory, principles and techniques of instrumental analytical and laboratory methods used for field soil investigations. Focus will be on description of (1) field experimental designs and multivariate SAS programming; (2) field measurements of soil respiration (CO₂ emission) and biological activity; (3) rainfall impact and soil erosion; (4) soil temperature and heat flux; (5) soil compaction and bulk density; (6) soil moisture, texture, and water infiltration; (7) chemical analysis of soil properties and contaminants, (8) nutrient testing of soil, plants, and natural waters, (9) characterization of soil microbial and faunal communities in soils and (10) activity of microorganism relative to biogeochemical processes. Operational theory and hands-on experience of field and laboratory instruments will be stressed.

CONTACT INFORMATION

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REPORTS, EXAMINATIONS AND GRADING

Required reports will be assigned by individual instructors along with the points that can be earned by each report. Dates of exams and exam points will be announced at least one week before the exam date. Attendance and participation will count for 25% of the final grade.
COURSE SCHEDULE

**WEEK 1 (Warren Dick, Rafiq Islam)**
**Wednesday - August 22**
General overview of the class; sampling techniques for measuring temporal, vertical, and spatial variability.

**Friday – August 24**
Experimental design, analysis of variance, partitioning of errors and SAS programming for ANOVA and multivariate analyses, various statistical approaches

**WEEK 2**
**Wednesday – August 29**
Soil quality assessments (Rafiq Islam)

**Friday – August 31**
Field measurements of CO₂, N₂O, and CH₄ (Warren Dick)

**WEEK 3 (Warren Dick)**
**Wednesday – September 5**
Soil temperature

**Friday – September 7**
Plant biomass measurements and residue cover

**WEEK 4 (Warren Dick)**
**Wednesday – September 12**
Methods to estimate C sequestration

**Friday – September 14**
Erosion estimates

**WEEK 5 (Warren Dick)**
**Wednesday – September 19**
Earthworm and soil microvertebrate sampling (Guest lecturer)

**Friday – September 21**
Use of soil maps

**WEEK 6 (Nick Basta)**
**Wednesday – September 26**
Introduction to soil chemical measurements, soil processing and soil preparation. Sampling for soil pH, total CN and organic C

**Friday – September 28**
Soil contaminant assessment: metal(loids)

**WEEK 7 (Nick Basta)**
**Wednesday – October 3**
Soil nutrients/fertility, available N, available P, available micronutrients

**Friday – October 5**
Field measurements of nutrients and contaminants in soil/water

**WEEK 8 (Nick Basta)**
**Wednesday – October 10**
Soil contaminant assessment, toxic organic chemicals

**Friday – October 12**
Field chemistry data interpretation

**WEEK 9**
**Wednesday - October 17 (Nick Basta)**
Urban soil measurements

**Friday – October 19 (Richard Dick)**
N mineralization/ Nitrification/denitrification

**WEEK 10 (Richard Dick)**
**Wednesday – October 24**
Respiration and enzyme activities and kinetics

**Friday – October 26**
Microbial biomass C and other indicators of biomass

**WEEK 11 (Richard Dick)**
**Wednesday – October 31**
Microbial enumeration and direct counts/microscopy

**Friday – November 2 (Richard Dick)**
Microbial profiling – Phospholipid fatty acids: Extraction of fatty acids (FA) and GC analysis
WEEK 12 (Richard Dick)
Wednesday – November 7
Microbial Profiling – Nucleic acids – Extraction from environmental samples/analytical methods

Friday – November 9
Microbial data analyses, nucleic acid searches/investigations – Use of ordination multivariate statistics to determine shifts in microbial community structure (PC Ord software) (Drs. Richard Dick, Nigel Hoilett); Phylogenetic analysis software and data bases (Dr. Linda Dick)

WEEK 13
Wednesday – November 14 (Nigel Hoilett, Linda Dick)
Calculations and discussion questions

Friday – November 16 (Ed McCoy)
To be determined.

WEEK 14 (Ed McCoy)
Wednesday – November 21
To be determined.

Friday – September 23 (Thanksgiving Vacation)

WEEK 15 (Ed McCoy)
Wednesday – November 28
To be determined.

Friday – November 30
To be determined.

EXAMS AND GRADES
Mid-term exam will count for 25% of the total points; Final exam will count 25% of the total points; 5 points for each of the mid-term and final presentations (10%); and lab reports will count 40% of the total points. The final grade will be assigned as \( \geq 90 = A; >86 – 89 = B+; >82 – 85 = B; \text{ and } <82 = C+ \).
NOTE #1: This year we will go to Waterman Farm near campus (Woody Hays Road) for all field investigations.

NOTE #2: All lesson plans and field exercises should be written-up as follows:
- Introduction
- Scientific background
- Field exercise description
- Data analyses/interpretation required
- Report format required.

NOTE 3: Assignment of lectures will occur after exercises are written and will have to take into account travel and other conflicts.

NOTE 4: Oral presentations
- Mid-term presentation (Week 6)
- Final presentation (Week 11)

NOTE 6: Examinations
- Mid-term (Week 5)
- Term final (Week 12)

ACADEMIC MISCONDUCT STATEMENT
Academic misconduct as defined by the university (Faculty Rule 3335-31-02) will not be tolerated. Students guilty of plagiarism of laboratory reports or cheating on examinations will be assigned a grade of E.

DISABILITY STATEMENT
Students with disabilities who need accommodations should see one of the course instructors during office or contact them by e-mail to make arrangements to address the disability. Special needs must be discussed and arrangements made well in advance (preferably before the first week of class) of when arrangements to accommodate specific needs are required. Special accommodations may be arranged through the OSU Office of Disability Services, 150 Pomerene Hall, 1760 Neil Ave., Telephone 614-292-3307, www.ods.ohio-state.edu.