Environment and Natural Resources 3001
Soil Science Laboratory
Spring Semester 2017

(1 Credit Hour)

Semester Syllabus

Course Instructor:
Sandy Jones
423B Kottman Hall
jones.13 @osu.edu

Course Coordinator:
Dr. Brian K. Slater
414D Kottman Hall
Telephone: 292-5891
Cell: 581-9102
slater.39@osu.edu

Teaching Associates:
Matt Bright
Ellen Maas
Emma Kurth

Times and Location:

5 sections
M  9:00 AM – 12:00 PM
M  4:00 PM – 7:00 PM
W  9:30AM – 12:30 PM
Th  6:00 PM – 9:00 PM
F  9:00 AM – 12:00 PM

Room 403, Kottman Hall

GE Credit:

ENR 3001 Soil Science Laboratory is available for GE credit when taken together with
ENR 3000, Soil Science. Both courses must be completed for GE credit.

Student Learning Goals and Objectives:

GE Category - 2. Breadth: A. Natural Science
Physical Science
Goals:

Students gain understanding of the principles, theories, and methods of modern soil science, the relationship between soil science and technology, the implications of scientific discoveries regarding the soil resource and the potential of science and technology to address problems of the contemporary world.

Expected Learning Outcomes:

1. Students understand the basic facts, principles, theories and methods of modern soil science.
2. Students learn key events in the history of soil science.
3. Students provide examples of the inter-dependence of scientific and technological developments.
4. Students discuss social and philosophical implications of scientific discoveries related to the soil resource and understand the potential of science and technology to address problems of the contemporary world, particularly environmental issues, food security, and human health.

Specific Learning Outcomes:

1. Students will be introduced to standard methods for measuring important soil characteristics, including morphological, physical, engineering, chemical and biological properties.
2. Students experience standard laboratory techniques and good laboratory practice.
3. Students will gain an understanding of the collection, analysis and interpretation of soil data.
4. Students will compare and contrast properties of soils from different locations.
5. Students will understand how to solve simple problems related to soil management, based on soil property data collected and measured in a laboratory setting.
6. Students will be introduced to the US Soil Taxonomy and the Web Soil Survey and practice classifying soils at a broad level.
7. Students learn about important soil processes and their influence on soil behavior by measuring changes in properties over time.
8. Students understand the use of online soil survey information, and apply available information by developing a land use plan based on soil limitations and opportunities.

Learning goals and objectives will be satisfied through the sequence of presentations, laboratory exercises, quizzes, individual feedback, assigned readings and the land use planning project.
Course Description:

This introductory course in soil science laboratory practice complements ENR 3000 Soil Science lecture class. Each practical period will include up to 1 hour of lecture in which important principles and procedures of soil data collection, analysis and interpretation will be discussed. This introduction will be followed by practical exercises to illustrate the soil properties and processes discussed in the lab presentation. Subject matter will be presented in a variety of formats, including demonstrations, videos, lab measurements, problem solving, and reference materials.

Course Materials:

Soil Science Laboratory Manual. Available at beginning of lab class during second week of semester or from Zip Publishing, 1313 Chesapeake Ave after September 8.

Soils: An Introduction by Singer and Munns (reference only)
or Elements of the Nature and Properties of Soils by Brady and Weil (reference only)

Prerequisites:

1. Soil Science 3000 or concurrent enrollment
2. Understanding soils requires a working knowledge of the principles and vocabulary of the sciences, including elementary chemistry. Students taking this course without having received credit for Chemistry 101 or 121 (or an equivalent course) should be aware that understanding of relevant material from these courses is assumed, and time to review basic concepts of chemistry will be limited.

Course Content:

Introductory presentations and demonstrations will parallel ENR 3000 lecture materials at somewhat greater depth, and elaborate on standard and alternative laboratory methods for data collection, analysis and interpretation of soil morphological, physical, chemical, and biological properties. The hands-on exercises are based on standard lab methods and data collected will be interpreted to inform a series of questions to be provided as a lab report. All background material and lab report forms are provided in the Soil Science Laboratory Manual. Introductory presentations will also be provided on Carmen.

Assessment Format:

A short quiz (5-7 questions, multiple choice) will be given at the beginning of each lab period (except labs 1, 2), to encourage reading of the laboratory materials prior to the lab. Lab 1 is a film review and Lab report 2 is a review exercise covering background math, chemistry and dimensional analysis that will be helpful during the course. Lab reports consist of tables of data and descriptions collected during the lab practicum, and a series of questions related to data collected in the lab, data interpretation, and synthesis of the information presented. Lab reports generally are due at the subsequent lab; most of the report will be done during the lab period, with a week available for any outstanding questions and interpretations to be completed. Lab 4 is a more extensive exercise in
which students prepare a land use plan for an area of Ohio, based on online soil
information. Students choose either an integrated urban development or an agricultural
enterprise and base infrastructure development and a spatial plan on the Web Soil Survey
information for the chosen area, as well as other online sources. The report consists of a
land use plan map and a written justification for the decisions made. The report is
expected to be at least 2 pages double space (12 point type face), together with associated
maps and interpretation tables. Three weeks are allowed for the land use project.

The final exam will be comprehensive and consists of a variety of multiple choice
questions, short answer questions and problems related to soil data provided. Typically,
the final has about 50 questions to be completed in 1.75 hr.

**Grading:**

Each quiz is worth 10 points; the lowest two quiz scores will be dropped. Lab reports 1,
2,3,5,6,7,8, 9, 10, and 11 will each be worth 100 points. The lowest score of these 100
point lab reports will be dropped. Lab report 2 is a review exercise worth 100 points. The
land use plan report, is worth 200 points. The final exam will be worth 320 points. The
final exam will be comprehensive, and is an open book exam.

<table>
<thead>
<tr>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly quizzes (10, lowest score dropped)</td>
</tr>
<tr>
<td>Lab reports (12, lowest score dropped)</td>
</tr>
<tr>
<td>Land Use Project</td>
</tr>
<tr>
<td>Final exam</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

A curve will be used to assign letter grades. (In recent years, the curve has generally been
bimodal, with median grades in the Cs and Bs)

**Attendance:**

Please attend assigned lab section unless prior arrangements are made.
No make-up labs will be offered.
Lab reports will not be accepted without attendance verified by completion of the weekly
quiz.
## Course Outline and Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Lab</th>
<th>Quiz</th>
<th>Topic(s)</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Course Introduction, Dirt Movie, Problem Set</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>Dimensional Analysis, Math and Chemistry</td>
<td>Movie review</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Problem Set 1</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>1</td>
<td>Soil Forming Processes, Soil Profiles, Soil Morphology, Soil Color and Drainage</td>
<td>Lab Rpt2</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>2</td>
<td>Parent Materials, Soil Geography, Legal Description of Land, Soil Survey Interpretations; Land Use Project</td>
<td>Lab Rpt3</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>3</td>
<td>Soil Classification and US Soil Taxonomy</td>
<td>Lab Rpt4</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>4</td>
<td>Soil Consistence, Linear Extensibility, Heat of Wetting, Specific Surface Area</td>
<td>Lab Rpt5,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Land Use Project</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>5</td>
<td>Particle Size Analysis, Soil Texture, Clay Dispersion and Flocculation, Particle Density</td>
<td>Lab Rpt6</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>6</td>
<td>Soil-Air-Water Relationships, Bulk Density, Soil Water Content, Water Movement Through Soils</td>
<td>Lab Rpt7</td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>7</td>
<td>Cation Exchange Capacity, Soil Potassium</td>
<td>Lab Rpt8</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>8</td>
<td>Soil Organic Matter, Microbial Decomposition of Organic Residues, Soil Nitrogen</td>
<td>Lab Rpt9</td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td>9</td>
<td>Soil pH, Active and Exchangeable Soil Acidity, Soil Buffer Capacity, Liming Acid Soils, Soil Phosphorus</td>
<td>Lab Rpt10</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>10</td>
<td>Soil Carbon</td>
<td>Lab Rpt11</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>Final Exam Review</td>
<td>Lab Rpt12</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td>Final Exams</td>
<td></td>
</tr>
</tbody>
</table>
**Academic Misconduct:**

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct ([http://studentaffairs.osu.edu/info_for_students/csc.asp](http://studentaffairs.osu.edu/info_for_students/csc.asp)).

**Disability Services**

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; [http://www.ods.ohio-state.edu/](http://www.ods.ohio-state.edu/).