

Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: **ENVS 116**

Year: **2019-2020**

Course Title: **Soil Science**

Credit Hours: **3**

**Attendance Policy:** *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

**Services for Students with Disabilities:** *It is the College's policy to provide, on an individual basis, reasonable accommodation to students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.*

**Course Description**

This course will explore the physical, chemical, biological, hydrologic, and ecological aspects of agricultural soils. Students in this course will become familiar with the processes of soil formation and classification, the importance of soils to human societies, and the techniques used in soil fertility management. Lab fee required. ENVS 116 fulfills the SUNY Natural Sciences requirement. Prerequisite: Prior completion or concurrent enrollment in ENGL 099 if required by placement testing or prior completion or concurrent enrollment in ESL 120, 121, and 122 (or prior completion of ESL 103); Prior completion or concurrent enrollment in MATH 090 if required by placement testing; RDNG 099 if required by placement testing. 3 Cr. (2 Lec., 2 Lab). Fall Semester.

**Course Context/Audience**

ENVS 116 is a required course for students enrolled in the Sustainable Farming & Food Systems, A.A.S degree program. It may also be used to fulfill a lab science requirement or an unrestricted elective requirement.

**Basic Skills/Entry Level Expectations**

<b>Writing:</b>	W1	Prior completion or concurrent enrollment in ENGL 099 or prior completion or concurrent enrollment in ESL 120, 121, and 122 (ESL 103) if required by placement testing.
<b>Math:</b>	M1	Prior completion or concurrent enrollment in MATH 090 if required by placement testing.
<b>Reading:</b>	R2	RDNG 099 if required by placement testing

## Course Goals

Upon successful completion of this course, students will be able to identify the basic elements and processes involved in soil structure, chemistry, biology, hydrology, and ecology and be able to implement crop production techniques needed to maintain and enhance soil fertility in a sustainable farming system.

## Course Objectives/Topics

Objective/Topic	% Course
The student will come to understand the processes of soil formation and classification.	10%
The student will come to understand the physical properties of soils.	20%
The student will come to understand the biological and ecological properties of soils.	15%
The student will come to understand soil chemistry.	20%
The student will come to understand the hydrological properties of soils.	10%
The student will gain a critical understanding of the techniques for evaluating, maintaining, and managing soil fertility in a sustainable farming system.	15%
The student will come to understand the importance of soils to human societies, and to an environment conducive to sustaining life on earth.	10%

### *Potential Lecture Topics:*

Soil Health in Sustainable and Organic Farming  
The Importance of Soil to Civilizations and Life on Earth  
Soil Formation  
Soil Classification  
Soil Texture  
Soil Structure – Aggregation, Porosity, and Compaction  
Soil Water Relations  
Soil Aeration  
Soil Temperature  
Soil Acidity and Alkalinity  
Soil Colloid Chemistry  
Soil Aridity and Salinity  
Soil Nutrient Cycles and Soil Fertility  
Soil Organic Matter  
Soil Ecology  
Soil Nutrient Management

### *Potential Laboratory Topics:*

Soil Profiles and Soil Color  
Soil Moisture and Capillary Action  
Soil Hydrology and Percolation  
Soil Texture Assessments  
Soil Bulk Density Analysis  
Soil Ecology and Microorganism Diversity  
Soil Sampling and Soil Test Evaluation  
Soil Nutrient Analysis  
Soil Nutrient Plant Growth Experiment  
Soil Surveys and Mapping  
Soil Acidity  
C:N Ratio and Decomposition Rate  
Cation Exchange Capacity in Soils

**General Education Goals - Critical Thinking & Social/Global Awareness**

<p align="center"><b>CRITICAL THINKING OUTCOMES</b></p>	<p align="center"><b>HOW DOES THE COURSE ADDRESS THE OUTCOMES</b> (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)</p>
<p>Students will be able to</p> <ul style="list-style-type: none"> <li>➤ develop meaningful questions to address problems or issues.</li> <li>➤ gather, interpret, and evaluate relevant sources of information.</li> <li>➤ reach informed conclusions and solutions.</li> <li>➤ consider analytically the viewpoints of self and others.</li> </ul>	<p>This course will use an inquiry based approach to look at the various aspects of soil science and soil fertility management.</p> <p>Students will apply theoretical soil science concepts to hands-on soil fertility management in a sustainable farming system.</p> <p>Students will be asked to evaluate their own personal beliefs and those of others in the context of current knowledge in the field of soil science, and how these decisions shape soil fertility and general farm management choices.</p> <p>Students will perform and interpret the results of laboratory experiments testing various soil science concepts.</p> <p>These outcomes are addressed through, lectures, readings, writing exercises, discussion, laboratory exercises, and field observations..</p>
<p align="center"><b>SOCIAL/GLOBAL AWARENESS OUTCOMES</b></p>	<p align="center"><b>HOW DOES THE COURSE ADDRESS THE OUTCOMES</b> (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)</p>
<ul style="list-style-type: none"> <li>➤ Students will begin to understand how their lives are shaped by the complex world in which they live.</li> <li>➤ Students will understand that their actions have social, economic and environmental consequences.</li> </ul>	<p>Students will be able to understand how their lifestyles and farm management choices impact ecological systems and the surrounding environment.</p> <p>The course will examine the social dimensions of soil science, and the importance of soil to the success of human societies..</p> <p>The course examines the economic dimensions of sustainable farming, and focuses on why sustainable soil fertility management and other production decisions must consider economic feasibility.</p> <p>These outcomes are addressed through lecture, discussion, readings, writing exercises, laboratory exercises, and field observation.</p>

**Instructional Methods**

Lectures, discussion, readings, writing exercises, laboratory exercises, and field walks are all appropriate.

## Methods of Assessment/Evaluation

Method	% Course Grade
Participation	0-10%
Writing Assignments	0-20%
Projects	0-20%
Quizzes and Tests	35-65%
Laboratory Reports	10-30%

### Text(s)

Elements of the Nature and Properties of Soil, Brady, N. & Weil, R., 3<sup>rd</sup> ed. 2007. John Wiley & Sons (ISBN 978-0-471-73828-2)

### Bibliography

Davies, G., and Lennartsson, M., eds. 2006. Organic Vegetable Production: A Complete Guide. Crowood Press. (ISBN 978 1861-2678-87)

Organic Soil Fertility Management, Gilman, S., 2002. Chelsea Green (ISBN 1-931498-28-8)

Managing Cover Crops Profitably, Clark, A. Editor. 3<sup>rd</sup> ed. 2007. Handbook Series Book 9 (3rd ed. ) Sustainable Agriculture Research and Education (SARE) (ISBN 978-1-888626-12-4)

### Other Learning Resources

<b>Audiovisual</b> Garcia, D.K. Symphony of the Soil. 2012. Available at <a href="http://www.symphonyofthesoil.com/">http://www.symphonyofthesoil.com/</a>
<b>Electronic</b> <a href="https://attra.ncat.org/">https://attra.ncat.org/</a> <a href="https://www.soils.org/">https://www.soils.org/</a>
<b>Other</b> No resources specified