



ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences and Business

COURSE: AGR 1005 Intro to Soil Sciences

Date: Spring 2023

Credit Hours: 4

Complete all that apply or mark "None" where appropriate:

Prerequisite(s): None

Enrollment by assessment or other measure? Yes No

If yes, please describe:

Corequisite(s): None

Pre- or Corequisite(s): None

Consent of Instructor: Yes No

Delivery Method:	<input checked="" type="checkbox"/> Lecture	3 Contact Hours (1 contact = 1 credit hour)
	<input type="checkbox"/> Seminar	0 Contact Hours (1 contact = 1 credit hour)
	<input checked="" type="checkbox"/> Lab	2 Contact Hours (2-3 contact = 1 credit hour)
	<input type="checkbox"/> Clinical	0 Contact Hours (3 contact = 1 credit hour)

Offered: **Fall** **Spring** **Summer**

CATALOG DESCRIPTION and IAI NUMBER (if applicable):

This course will cover such areas as: soil formation, color, structure, texture, classes and types. The classes will also include the use of fertilizers and the interpretation of soil tests. Laboratory experiments will be provided to enhance the work with soils and provide the student with ample opportunities to do class and individual experiments, and to ask questions. **IAI Equivalent: AG 904**

ACCREDITATION STATEMENTS AND COURSE NOTES:

None

COURSE TOPICS AND CONTENT REQUIREMENTS:

LECTURE TOPICS:	Weeks:
I. Introduction	1-2
A. Definition of Soil	
B. Soils as a Natural Body	
C. Soil Components—Air, Water, Inorganic, and Organic Solids	
II. Physical Properties	2-4
A. Soil Separates	
B. Texture	
C. Aggregation and Structure Characteristics	
D. Temperature	
E. Color	
F. Properties of Soil Mixture	
G. Pore Space	
H. Bulk Density	
I. Particle Density	
J. Aeration and Drainage	
K. Compaction	
L. Soil Water Relationships	
III. Chemical Properties	2-4
A. Morphology of Colloids	
B. Chemistry of Clays	
C. Ionic Exchange	
D. Acidity, Alkalinity (pH) and Salinity	
E. Reactions in Liming and Acidification	
IV. Biological Properties	2-3
A. Soil Organic Matter	
B. C:N Relationships	
C. N Transformation	
D. Soil Organism	
E. Sulfur Transformation	
V. Genesis and Classification	1-2
A. Profile	
B. Soil Forming Factors	
C. Soil Survey Methods	
D. Soil Survey Reports	
E. Soil Distribution	
F. Classification System	
VI. Conservation and Management	1-2
A. Drainage	
B. Erosion: Mechanisms and Control	
C. Irrigation	
D. Land Use Classification	
E. Environmental Quality	
1. Plant and Animal Waste	
2. Municipal and Industrial By-Products	
3. Nutrient Loading	
F. Tillage Systems	
G. Wetlands	

- H. Urban Soils
- VII. Soil Fertility and Fertilizers
 - A. Essential Elements
 - B. Fertilizers

1

LAB TOPICS

- Origin and Classification
- Soil Surveys
- Productivity Indexes
- Land Use Selection Exercises, i.e., soil profile, description
- Texture
- Structure
- Bulk Density and Pore space (compaction) Moisture
- N Transformation
- Temperature
- Ionic Exchange
- Acidity, Alkalinity—pH
- Nutrient Availability
- Soil Organic Matter
- Revised Universal Soil Loss Equation (R.U.S.L.E.)
- Fertilizer Recommendations
- Solu Bridge—Soluble Salts/EC
- Conservation and Management
- Using and Understanding GPS
- Tour of Soil Testing Lab
- Soil Sampling Procedure
- Horticultural Soils
- Urban Soils
- Soil Biological Activity
- Soil Quality
- Soil Water Relation

INSTRUCTIONAL METHODS:

- Lecture
- Discussion
- Student Reports
- Lab Demonstration
- Hands-On Activity

EVALUATION OF STUDENT ACHIEVEMENT:

A= 90-100

B= 80-89

C= 70-79

D= 60-69

F= 0-59

Exams and Quizzes—60%

Assignments (written and lab work)—30%

Student Attendance and Class/Lab Participation—10%

INSTRUCTIONAL MATERIALS:

Textbooks

The most recent version of the following textbooks may be used:

Elements of the Nature and Properties of Brady, Nyle and Weil, Ray R. Pearson

The Nature and Properties of Soils. Brady, Nyle and Weil Ray R. Pearson.

Soil Science and Management. Plaster, Edward J. Delmar Publishers.

Understanding soils. Illinois Soil Classifiers Association. USDA, NRCS.

Soil Biology. NRCS.

Laboratory Manual for Introductory Soils. Weil, Ray R. Kendall Hunt Publishing.

Introduction Soil Laboratory Manuarl. Hassett, J.J. Stipes.

Introductory Soil Science Laboratory Manual. Palmer and Troch. Iowa State.

Introductory Experimental Soil Science. Sabey, Klubek, Varsa, Chong.

Resources

Soil Science Simplified. Khonke and Franzmeier. Waveland Press.

Soils and Soil Fertility. Troch, F.R. and Thompson, L.M. Oxford Press.

Soil Fertilizer Handbook. The Fertilizer Institute. Washington, D.C.

PPI & Others.

Study manuals for CCA Examination. American Society of Agronomy

Elements of the Nature and Properties of Soils test bank. Pearson.

Fundamentals of Soil Science. Foth, H.D. Wiley Books

Websites

USGS aerial imagery and topographic maps <http://tenaserver-usa.com>

USDA Geospatial Database <http://lighthouse.nrcs.usda.gov/lighthouse/>

Illinois Agronomy Handbook <http://www.aq.uius.eduliahj>

Soil Science Society of America <http://www.soils.org/>

American Society of Agronomy <http://www.agronomy.org/>

PPI <http://www.ppi-far.org>

National Conservation Research Service <http://il.nrcs.usda.gov>

University of Minnesota <http://www.soils.umn.edularchive/imagesimages/thumbs>

Math & Calculations for Agronomy and Soil Scientists <http://www.ipni.net>

LEARNING OUTCOMES AND GOALS:

Institutional Learning Outcomes

- 1) Communication – to communicate effectively;
- 2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion;
- 3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally;
- 4) Responsibility – to recognize how personal choices affect self and society.

Course Outcomes and Competencies

1. Identify and explain basic and applied chemical, physical, and biological concepts in soil.
Competency 1.1—Students will be able to identify and discuss soil fertility.
Competency 1.2—Students will be able to identify and discuss soil Ph and salinity.
Competency 1.3—Students will be able to identify and discuss plant nutrition.
Competency 1.4—Students will be able to identify and discuss organic matter.
Competency 1.5—Students will be able to identify and discuss the soil food chain and the carbon cycle.
Competency 1.6—Students will be able to identify and discuss soil microorganisms.
Competency 1.7—Students will be able to identify and discuss managing soil organisms.
Competency 1.8—Students will be able to identify and discuss the physical properties of soil.
2. Identify and describe the origin, classification, and distribution of soils and their relationship to people and food production.
Competency 2.1—Students will be able to identify and discuss soil origin and development.
Competency 2.2—Students will be able to identify and discuss soil classification and survey.
Competency 2.3—Students will be able to identify and discuss soil distribution.
Competency 2.4—Students will be able to identify and discuss the relationship between soil and food production.
3. Develop an understanding of the management and conservation of soils.
Competency 3.1—Students will be able to identify and discuss drainage.
Competency 3.2—Students will be able to identify and discuss irrigation.
Competency 3.3—Students will be able to identify and discuss erosion.
Competency 3.4—Students will be able to identify and discuss tillage systems.
Competency 3.5—Students will be able to identify and discuss land use classifications.
4. Develop an understanding of the environmental impact of soil use.
Competency 4.1—Students will be able to identify and discuss environmental quality issues, including plant and animal waste, municipal and industrial by-products, and nutrient loading.
Competency 4.2—Students will be able to identify and discuss wetlands.
Competency 4.3—Students will be able to identify and discuss urban soils.