

ILLINOIS VALLEY COMMUNITY COLLEGE



COURSE OUTLINE

DIVISION: Natural Sciences and Business

COURSE: AGR 1005: Intro to Soil Sciences

Date: April 15, 2016

Credit Hours: 4

Prerequisite(s):

Delivery Method: **Lecture** **3 Contact Hours (1 contact = 1 credit hour)**
 Seminar **0 Contact Hours (1 contact = 1 credit hour)**
 Lab **2 Contact Hours (2-3 contact = 1 credit hour)**
 Clinical **Contact Hours (3 contact = 1 credit hour)**
 Online
 Blended

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

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>: **AG 904**

CATALOG DESCRIPTION:

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.

GENERAL EDUCATION GOALS ADDRESSED

[See last page for Course Competency/Assessment Methods Matrix.]

Upon completion of the course, the student will be able:

[Choose up to three goals that will be formally assessed in this course.]

- To apply analytical and problem solving skills to personal, social and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
- To understand and use contemporary technology effectively and to understand its impact on the individual and society.
- To work and study effectively both individually and in collaboration with others.
- To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
- To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
- To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

1.

page for more information.]

[Outcomes related to course specific goals. See last

Upon completion of the course, the student will be able to:

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.

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

INSTRUCTIONAL MATERIALS:

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.

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

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%

OTHER REFERENCES

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.ag.uius.edu/iah/>

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.edu/larchive/imageslimages/thumbs>

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

