*Updated 11/2021*

**SYLLABUS**

**INTRODUCTION TO AGRICULTURAL EDUCATION**

**Credit: 2-3 semester hours – No Prerequisite**

**Course Description:**

IAI description: AG 911: *Introduction to Agricultural Education* (2-3 semester hours)

*An introduction to Agricultural Education programs and delivery systems, state and federal policies; the nature of teaching in school and non-school settings; types and purposes of Agricultural Education; program components; approaches to teaching, teacher characteristics; community relationships; educational change and innovation; trends and developments in Agricultural Education. A general study of the nature of Agricultural Education along with its opportunities and responsibilities will be explored.*

**Recommended Text:** *(see Suggested References)*

**Objectives:** Upon completion of the course, students will be able to:

1. Define and describe the scope and nature of agricultural education.

2. Discuss professionalism, including licensure and certifications, for a career in agricultural education.

3. Identify and describe the school-based agricultural education organizational structure in Illinois and how it fits in with general education at the local and state levels.

4. Identify and describe career opportunities in agricultural education.

5. Explain the philosophical basis for agricultural education.

6. Identify major historical events and key influential individuals that have shaped agricultural education from its inception to present day.

7. Describe the nature, role, and components of agricultural education programs in formal, non-formal, and informal settings.

8. Describe the principles of learning to establish a basic understanding of how humans process information.

9. State the characteristics of effective agricultural educators and their programs.

10. Create an effective instructional plan and successfully implement the plan during a micro-teaching.

**Topic Schedule**:

**I.** **Introduction to Agricultural Education** 6-9 hours

**(Objectives 1, 2, 3, 4)**

A. What is Agricultural Education?

1. Definition of Agricultural Education

2. Scope and Nature of Agricultural Education

B. Professionalism in Agricultural Education

1. Teacher Licensure and Certifications

2. Professional Organizations

C. Organizational Structure of Agricultural Education

1. How Ag Education fits into General Education/Career & Technical Education

2. Ag Education Partners- ISBE, IAVAT, FFA, FCAE, ILCAE, ICAE, etc.

D. Career Opportunities in Agricultural Education

**II.** **Philosophical Foundations and History of Agricultural Education** 4-6 hours

**(Objectives 5, 6)**

A. Philosophies and education theories influencing agricultural education

B. Developing a Teaching Philosophy

C. History of Agricultural Education

1. Individuals influencing the development of Ag Education

2. Key legislation in CTE/Agricultural Education

- Funding and Grant Resources

- Regional Offices of Education (ROE’s) and Education for Employment (EFE’s)

3. History of the FFA Organization

**III.** **Educational Types and Programs** 5-7 hours

**(Objective 7)**

A. Types of Education (Formal, Non-formal, and Informal)

B. School-Based Agricultural Education (Three-Circle/Component Model)

1. Classroom and Laboratory Instruction

2. FFA Programs

3. Supervised Agricultural Experiences

C. Illinois Extension Service/ 4-H Programs

D. Agricultural Literacy- Ag in the Classroom through Adult

**IV.** **Teaching and Learning in Agricultural Education** 5-7 hours

**(Objectives 8, 9)**

A. Principles of Learning- How People Learn

B. Domains of Learning & Bloom’s Taxonomy

C. Characteristics and Qualities of Effective Educators

1. Teacher roles and expectations, responsibilities, and experiences
2. Teaching to the diverse and varied students in the agriculture education classroom

D. Characteristics and Components of Successful Agriculture Education Programs

**V.** **The Instructional Planning Process** 10-15 hours

**(Objective 10)**

A. The Instructional Process & Lesson Planning

B. Writing Objectives & Using Educational Standards

C. Instructional Methods: Teaching Strategies and Engaging Activities

D. Creating Effective Instructional Aids

E. Assessing Learning and Creating Assessments

**Suggested Activities**:

1. Field trips to local high schools and community colleges & universities

2. Participate or host FFA CDEs and/or judge FFA/SAE award programs

3. Guest Speakers – Examples: Successful Agricultural Education teachers, FCAE staff, FFA alumni, Illinois FFA Center staff, ISBE Ag Ed Consultant, Ag in the Classroom Representative, Cooperative Extension Personnel, EFE Director, or Regional Office of Education Superintendent

4. Develop a lesson plan and teach a lesson/micro-teaching

5. Participate in activities and/or conferences of the IAVAT Student Branch & collegiate agricultural education organizations

6. Job shadowing, clinical experiences, pre-service internships, partnership with Ag in the Classroom

**Qualifications of Instructors:**

The preferred qualifications of the instructor of this course should be:

1. B.S. degree in Agriculture with certification to teach high school Agricultural Education.

2. Three (3) years of experience in teaching high school agriculture.

3. Master’s degree in Agriculture with specialized training for teaching.

**Suggested References and Supplemental Resources**:

Phipps, L. *Handbook on agricultural education in public schools (out of print).*

Talbert et al. *Foundations of agricultural education*. *(newest edition).*

*The Agricultural Education Magazine- https://www.naae.org/profdevelopment/magazine/*

*Official FFA Manual- https://www.ffa.org/official-manual/*

*Ag Teachers Manual- https://ffa.app.box.com/v/agteachersmanual*

*FFA Student Handbook-* [*https://ffa.app.box.com/v/studenthandbook/file/639012943093*](about:blank)

Thoron A. C., & Barrick R. K. (Eds.). (2022). *Preparing agriculture and agriscience educators*  
  
            *for the classroom*, IGI- Global. doi:10.4018/978-6684-3420-8

*University Agricultural Education Websites:*

***Illinois State University****- https://agriculture.illinoisstate.edu/education/; https://education.illinoisstate.edu/teacher/*

***Southern Illinois University***

*https://coas.siu.edu/academics/bachelors/agsystems/agricultural-education/teachag.html*

***University of Illinois****- https://alec.illinois.edu*

***Western Illinois University****- http://www.wiu.edu/cbt/agriculture/; http://www.wiu.edu/coehs/teacher/*

*Other websites:*

*Agriculture Education Curriculum* [*www.ilaged.org*](about:blank)

*(Log-in required- pathway needs provided if possible)*

*https://www.isbe.net/Pages/Agriculture-Education.aspx https://www.isbe.net/Pages/Educator-Licensure.aspx*

[*www.ffa.org*](about:blank)

*www.naae.org* [*www.agintheclassroom.org*](about:blank)

*www.mycaert.com*

*www.teachag.net*

May have ADDITIONAL RESOURCES- NEED TO COPY FROM IL AG ED WEBSITE [https://www.ilaged.org/page.aspx?ID=4739](about:blank)

*From 2022 IACCAI Conference Handbook*

**SYLLABUS**

**INTRODUCTION ANIMAL SCIENCE**

**Credit: 3-4 semester hours; (includes minimum 1 cr. hr. lab requirement)  
 No prerequisite** It is recommended by the articulation committee that the maximum semester or quarter hours be included in the course.

**Course Description**

IAI description: AG 902: *Introduction to Animal Science* (3-4 semester hrs. includes minimum 1 cr. hr. lab requirement @ 1500 minutes per credit hour)

The application of the sciences of genetics, physiology, and nutrition to the improvement of the animal industries and an introduction to management and production practices. Includes animal breeds, breeding, and selection; anatomy, physiology, nutrition, growth; environment, health and sanitation; products and marketing; production technology and economics; animal behavior; and current issues in animal science.

**Objectives:**

1. Demonstrate the application of the science of genetics; physiology and nutrition to the improvement of the animal science.

2. Acquaint the student with Describe the management and production practices of these industries.

3. Familiarize the student with Identify the products of these industries and their contribution to society and the mankind and his environment.

**Approved Texts:**

Blakely and Blade, *The Science of Animal Husbandry*, current edition

Taylor and Field, *Scientific Farm Animal Production*, current edition

**Topics:**  **Hours**

I. Introduction 2-4 1-2

A. Scope and Importance

B. History, Growth, and Development of the Animal Industries

C. Careers and Opportunities

II. Breeds 1-3

A. Beef, Dairy, Horses, Companion Animals, Poultry, Sheep, Goats, and Swine

III. Reproduction Breeding and Selection 7-9 4-6

A. Endocrine Systems

B. Reproductive Systems

1. Male

2. Female

a. Milk secretion

b. Physiology of egg laying

C. Principles of Genetics

B. Selection Breeding Systems

D. Improvement Programs

~~D. Mating System~~

IV. Anatomy and Physiology 8-10

A. Skeletal and Muscular Systems MOVE TO MEATS

B. Respiratory and Circulatory Systems

C. Endocrine Systems MOVE TO ABOVe

D. Reproductive Systems MOVE TO ABOVe

1. Male

2. Female

a. Milk secretion

b. Physiology of egg laying

E. Digestive Systems MOVE TO NUTRITION SYSTEMS

V. Nutrition 7-9

A. Digestive Systems

Nutrients and Feed Analysis

B. Nutrient Requirements

C. Feedstuffs

VI. Growth 1-2

A. Measurement of Growth

B. Factors Affecting Growth

VII. Environment 2-4 1-2

A. Temperature

B. Humidity

C. Light

D. Space

E. Adaptation

VIII. Animal Health, Behavior, and Sanitation 3-5

A. Sanitation Program

B. Disease Control Program

C. Parasite Control Program

D. Public Health

E. Biosecurity

IX. Animal Products, Grades, and Marketing 8-10 6-9

1. Meat
   1. Skeletal and Muscular Systems

B. Milk

C. Eggs

D. Wool

X. Marketing COMBINE WITH ANIMAL PRODUCTS AND GRADING 2-4

A. Systems

B. Grading and Classification

XI. Production, Technology, and Economics 4-6

A. Performance Standards

B. Livestock Enterprises and Management

1. Contract farming

2. Vertical integration

3. Independent farming

C. Enterprise Cost Analysis

XII. Animal Behavior MOVE INTO ANIMAL HEALTH ABOVE 1-3

A. Types of Animal

XIII. Current Issues 2-4

A. Animal Welfare and Ethics

B. Waste Management

C. Biotechnology

D. Food Safety

E. Diseases

Recommendation

LABS: Will vary based on facilities/resources of each individual institution, but in general are coordinated with lecture topics.

LOOK FOR LABS FROM COVID MEETING

ADDITIONAL RESOURCES- NEED TO COPY FROM IL AG ED WEBSITE [https://www.ilaged.org/page.aspx?ID=4739](about:blank)

**References:**

Ensminger, *Animal Science*, current edition (not currently in print)

**2015**

**Syllabus**

**Introductory Crop (Plant) Science**

Credit: 3-4 semester hours (includes minimum 1 credit hour lab requirement)

No Prerequisite

**Course Description:**

IAI Description: AG 903: *Introduction to Crop or Plant Science* (3-4 semester hours which includes minimum 1 credit hour lab)

The basic principles of plant growth, including human and environmental influences and the theoretical and practical application of agronomic principles to crop production in Illinois, the Midwest, and the United States. Includes the historical and economic importance of crop plants for food, feed, and fiber; origin, classification, and geographic distribution of field crops; environmental factors and agronomic problems; crop plant breeding, growth, development, and physiology; cropping systems and practices; seedbed preparation, tillage, and crop establishment; pests and controls; and harvesting, storing, and marketing practices.

The basic principles of plant growth, including human and environmental influences and the theoretical and practical application of agronomic principles to crop production. Includes the historical and economic importance of crop plants for food, feed, and fiber; origin, classification, and geographic distribution of field crops; environmental factors and agronomic problems; crop plant breeding, growth, development, and physiology; cropping systems and practices; seedbed preparation, tillage, and crop establishment; pests and controls; and harvesting.

**Objectives:**

1. The student will be able to identify and explain the importance of crops on world food production.

2. Identify and describe the basic principles of plant growth.

3. Evaluate the theoretical and practical aspects of agronomic principles.

**Suggested Texts: (Current Edition)**

*Crop Science: Principles and Practices.* R. Mullen*.* Pearson Custom Publishing.

*Introduction to Plant Science.* R. Parker. Delmar Cengage Learning.

*Plant Science: Growth, Development, and Utilization of Cultivated Plants.* M. McMahon, A. Kofranek, and V. Rubatzky, Pearson.

*Principles of Field Crop Production.* J. Martin, R. Waldren, and D. Stamp, Pearson.

*Principles of Crop Production,* Acquaah.

*Introduction to Agronomy,* Sheaffer & Moncada

*Plant and Soil Science,* R. Parker, Delmar Cengage Learning

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Topics:** | | | **Periods** | |
| I. Importance of Crop Plants - Food, Feed, Fiber, Fuel | | | 2 – 4 | |
| A. Contributions | | |  | |
| 1. To humankind and their welfare | | |  | |
| 2. To the GDP | | |  | |
| 3. To state gross product | | |  | |
| 4. To balance of trade, etc… | | |  | |
| B. Historical Significance | | |  | |
| C. Economics | | |  | |
| 1. Social | | |  | |
| 2. Comparative Advantage | | |  | |
| 3. Markets | | |  | |
| 4. Transportation | | |  | |
| 5. Population | | |  | |
| II. Origin, Classification, and Geographic Distribution of Field Crops | | | 2 – 3 | |
| III. Important Field Crops of Illinois, the Midwest, the United States, and the World | | | 1 – 3 | |
| A. Grain | | |  | |
| B. Oil | | |  | |
| C. Fiber | | |  | |
| D. Sugar | | |  | |
| E. Drug | | |  | |
| F. Forage | | |  | |
| G. Biofuel | | |  | |
| IV. Crop Environmental Factors | | | 4 – 6 | |
| A. Air | | |  | |
| B. Light | | |  | |
| C. Moisture (Water) | | |  | |
| D. Temperature | | |  | |
| E. Soil | | |  | |
| V. Agronomic Problems, Perceptions and Questions | | | 3 – 4 | |
| A. World Population and Food Supply | | |  | |
| B. Pollution - Air, Water, Soil | | |  | |
| C. Organic and Sustainable Agriculture | | |  | |
| D. Energy | | |  | |
| E. Pesticides and Human Health | | |  | |
| VI. Growth and Development of Crop Plants | | | 4 – 6 | |
| A. Botany of Plants | | |  | |
| 1. Anatomy | | |  | | |
| 2. Morphology | | |  | | |
| B. Identification | | |  | |
| 1. Seeds | | |  | | |
| 1. Crop Plants 2. Cover Crop Seeds and Plants | | |  | | |
| C. Form and Function | | |  | |
| 1. Structure | | |  | | |
| 2. Function | | |  | | |
| D. Crop Propagation | | |  | |
| 1. Asexual Propagation - Vegetative | | |  | | |
| 2. Sexual Propagation - Seed | | |  | | |
| a. Seed Quality | | | |  | |
| b. State Laws | | | |  | |
| c. Crop Improvement Association (certified seed) | | | |  | |
| E. Growth Regulation and Development - Plant Regulators in  Agriculture Today and in the Future | | |  | |
| VII. Crop Physiology | | | 4 – 6 | |
| A. Essential Elements and Plant Nutrition | | |  | |
| B. Role of Water and Water Management | | |  | |
| C. Photosynthesis / Respiration | | |  | |
| VIII. Cropping Systems and Practices | | | 5 – 7 | |
| A. Monoculture | | |  | |
| B. Rotation | | |  | |
| C. Multiple Cropping and Intercropping | | |  | |
| D. GIS/GPS Site Specific Applications | | |  | |
| E. Organic Cropping Systems | | |  | |
| F. Seedbed Preparation | | |  | |
| G. Stand Establishment - Seeding Methods, etc… | | |  | |
| H. Conservation Tillage Systems and Practices  I. Harvesting and Storing  J. Cover Crops  K. Carbon Sequestration  L. Greenhouse Gases  M. Biologicals | | |  | |
| IX. Integrated Pest Management | | | 4 – 5 | |
| A. Pests Control and Resistance Management | | |  | |
| 1. Animals- Insects, Mammals, etc. | | |  | |
| 2. Diseases | | |  | |
| 3. Weeds | | |  | |
| 1. Nematodes | | |  | |
| X. Crop Breeding and Improvement | | | 3 – 5 | |
| A. Genetics | | |  | |
| B. Plant Introduction | | |  | |
| C. Selection | | |  | |
| D. Hybridization | | |  | |
| E. Mutation | | |  | |
| F. Genetic Modification  G. Value Added Traits  H. Biotechnology | | |  | |
|  | | |  | |
| **Suggested Lab Exercises:**  Agronomy Equipment  Fertilization and Seed Formation  Morphology of Grasses and Legumes  Pest Identification, Scouting and IPM  Grain Grading and Crop Judging  Seed Identification, Quality and Certification  Vegetative and Floral Identification of Crops and Weeds  Germination, Emergence and Seedling Development of Monocots (Corn) and Dicots (Soybeans)  Crop Problem Scenarios (Troubleshooting)  DNA Extraction Exercise  Biotechnology  Tour Agronomic Companies  Yield Checks  Erosion Lab Using Real Farm Information  Research Analysis and Interpretation  Biofuels  Fertilizers and Applications  Cover Crop Labs- including water quality, varieties, etc.  ***Note****: Use of live plants or a series of demonstrations from seeds to mature plant development is recommended.* | | |  | |

**Suggested References**

*Modern Corn and Soybean Production.* R. Hoeft, E. Nafziger, R. Johnson, and S. Aldrich, MCSP Publications. ([http://www.mcsp-pubs.com/](about:blank))

*Illinois Pesticide Applicator Training Manuals.* Pubs Plus, University of Illinois. http://web.extension.illinois.edu/privatepsep/

*Plant Pathology - Plant Disease Series (RPD),* University of Illinois VISTA. ([http://www.aces.uiuc.edu/vista/rpd.html](about:blank))

*Field Crop Scouting Manual.* Pubs Plus, University of Illinois. ([https://pubsplus.uiuc.edu/index.html](about:blank))

*Weeds of the Great Plains.* Nebraska Department of Agriculture. ([http://www.agr.state.ne.us/forms/nw11.pdf](about:blank))

*Crop Production*. J. Vorst. ([http://www.stipes.com/agriculture.html](about:blank)).

*Corn & Soybean Field Guide.* Purdue University.(http://www.ag.purdue.edu/agry/dtc/Pages/field-guide.aspx)

*CHECK LINK ON ABOVE*

*Ag Forage Field Guide*, Purdue University – currently not available. ([https://secure.agriculture.purdue.edu/store/default.asp](about:blank))

*Crop Production: Evolution, History, and Technology.* C. Wayne Smith. Wiley.

*Alfalfa Management Guide*. D. Undersander, R. Becker, D. Cosgrove, E. Cullen, J. Doll, C. Grau, K. Kelling, M. Rice, M. Schmitt. American Society of Agronomy.

*Illinois Agronomy Handbook,* details

*Crop Sciences Lab Manual,* ITCS.

*Weeds of the South* by Charles T. Bryson and Michael S. DeFelice. University of Georgia Press

*Weeds of the Midwest* by Charles T. Bryson and Michael S. DeFelice. University of Georgia Press

*Purdue Crop Management CDs* [http://www.agriculture.purdue.edu/agcrop/](about:blank)

*Pastures for Horses: A Guide to Rotational Grazing CD*

[http://learningstore.uwex.edu/%2FPastures-for-Horses-A-Guide-to-Rotational-GrazingCD-P98.aspx](about:blank)

*CHECK LINKON ABOVE*

*Herbicide Mode of Action and Crop Injury Symptoms CD* [http://shop.extension.umn.edu/Default.aspx](about:blank)

*CHECK LINKON ABOVE*

*Illinois Agricultural Education Curriculum Resources* [http://www.agriculturaleducation.org/curriculum/](about:blank)

*USDA National Agricultural Statistics Service (NASS)* [http://www.nass.usda.gov/](about:blank)

*How a Corn Plant Develops*

[http://www.biologie.uni-hamburg.de/b-online/library/maize/www.ag.iastate.edu/departments/agronomy/corngrows.html](about:blank)

*CHECK LINK ON ABOVE*

*How the Soybean Plant Develops* [http://extension.agron.iastate.edu/soybean/production\_growthstages.html](about:blank)

*CHECK LINK ON ABOVE*

*Soybean Diagnostic Guide*  [http://www.plantsci.missouri.edu/soydoc/startup.htm](about:blank)

*Pest Management and Crop Development Newsletter (University of Illinois)*

[http://www.ipm.uiuc.edu/bulletin/index.php](about:blank)

*Purdue Forage Information* [http://www.agry.purdue.edu/ext/forages/](about:blank)

*University of Illinois IPM* [http://www.ipm.uiuc.edu/fieldcrops/index.html](about:blank)

*Illinois Agricultural Education* [www.ilaged.org](about:blank)

*Illinois High School Curriculum*[www.ilaged.org](about:blank)

YouTube

History Channel

Khan Academy

Crashcourse Biology

Midwest Covercrop Council

Crop Protection Network

[www.growipm.org](about:blank)

Weeds of the Northeast

Missouri Guide for Mode of Action and Weed ID

Iowa State Corn Nitrogen Rate Calculator

ADDITIONAL RESOURCES- NEED TO COPY FROM IL AG ED WEBSITE [https://www.ilaged.org/page.aspx?ID=4739](about:blank)

**2016**

**SYLLABUS**

**INTRODUCTION TO SOIL SCIENCE**

**Credit: 3 or 4 semester hours (Minimum 1 cr. hr. lab required)**

**Prerequisite: 1 course in H.S. Chemistry; College Chemistry is strongly recommended; Geology suggested**

**Course Description:**

IAI description: AG904: *Introduction to Soil Science* (3 or 4 semester hours)

An introduction to the chemical, physical, and biological properties of soils; the origin, classification, and distribution of soils and their influence on people and food production; the management and conservation of soils; and the environmental impact of soil use.

An introduction to the chemical, physical, and biological properties of soils; the origin, classification, and distribution of soils and their influence on people and food production; the management and conservation of soils; and the environmental impact of soil use. For a 4-hour credit course, a lab component is required for IAI approval.  **Prerequisite:**The panel strongly recommends that chemistry be at least a co-requisite on the course.

**REVISION: 11/2/2023 -** Clarified credit hours for lab and non-lab courses and added range of 3-4 credits. Added a strongly recommended prereq of Chemistry co-requisite. Effective Spring 2024

**Objectives:**

1. To describe develop an understanding and knowledge of the basic and applied chemical, physical, and biological concepts in soil.

2. To discuss develop an understanding of the origin, classification, and distribution of soils and their relationship to people and food production.

3. To evaluate develop an understanding of the management, health, and conservation of soils.

4. To evaluate develop an understanding of the environmental impact of soil use.

**Suggested Texts: (Current edition recommended)**

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

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

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

*Understanding Soils,* Illinois Soil Classifiers Assoc., USDA, NRCS

*Soil Biology,* NRCS

**Laboratory Manuals: (Current edition recommended)**

*Introduction Soil Laboratory Manual,* J.J. Hassett, Stipes.

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

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

*Soils Laboratory Manual,* K- State Edition, Colby, J. Moorberg, and David A. Crouse.

**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

G. Parent Material

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

I. Soil Health

J. Nutrient Loss Reduction Strategy

K. Cover Crop Systems

VII. Soil Fertility and Fertilizers 1

A. Essential Elements

B. Fertilizers

**Possible Lab Exercise or Activities:** *(Suggested minimum requirements would be a lab exercise or field trip for each major area of lecture.)*

1. Origin and Classification
2. Soil Surveys
3. Productivity Indexes
4. Land Use Selection exercise, i.e., soil profile, description
5. Texture
6. Structure
7. Bulk Density and Pore Space (compaction) Moisture
8. Nitrogen Transformation
9. Temperature
10. Ionic Exchange
11. Acidity, Alkalinity-pH
12. Nutrient Availability
13. Soil Organic Matter
14. Revised Universal Soil Loss Equation (R.U.S.L.E.)
15. Fertilizer Recommendations
16. Solu Bridge-Soluble Salts / EC
17. Conservation and Management
18. Using and Understanding GPS
19. Tour of Soil Testing Lab
20. Soil Sampling Procedure
21. Horticulture Soils
22. Urban Soils
23. Soil biological activity
24. Soil Health quality
25. Soil water relation
26. Cation Exchange Capacity
27. Soil Chemistry

**References: (Current edition recommended)**

*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

Test bank and online aids from textbook authors and publishers including Elements of the Nature &

Properties of Soil, Pearson

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

Math in Soil Science

NRCS Soil Quality Test Guide

Illinois Soil Classifiers Association

Illinois Soil Evaluation Fieldbook- FFA Land Use CDE Resource

**Software:**

ArcMap-ESRI

PPI - Nutrient management plan CCA CD

PPI - MEY Software

RUSLE Current NRCS

Digital Soil Survey Maps

Purdue soil program: [www.agry.purdue.edu/courses/agry255/agry255.htm](about:blank)

NRCS Soils Web Sites

iFARM, United Soils Inc. website

**Multi-Media:**

No Till, Protecting the Heartland-Syngenta

Tracks to Tires-John Deere

Tread Lightly and Pull Heavy-Caterpillar Price of Bounty – U of I Extension

Point of Precision-PPI

Faces of Change-PPI

Point of Revolution-PPI

Conservation on Your Own-Soil Conservation Services, National Association of Conservation

Districts Production Agriculture-Feeding People, Protecting the Environment, PPI

Forest Soils of Illinois Region 1 - Stronghurst, Fayette, Traer, Extension Services Prairie Soils of Illinois Region 1 - Tama, Muscatine, Sable, Extension Services

Soil Health Test Kit video (Check with Sustainable Agriculture Society for availability)

How Soils Erode-University of Illinois

How Water Moves Through Soil

Good Farming in Karst Country-U of I Extension

Irrigation-Kaw Valley Films

Fertile Minds video, Potash corp. (www.fertile-minds.org)

**Websites:**

USGS aerial imagery and topographic maps [http://tenaserver-usa.com](about:blank)

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

Illinois Agronomy Handbook [http://www.ag.uiuc.eduliahi](about:blank)

Soil Science of Society of America web page [http://www.soils.org/](about:blank)

American Society of Agronomy web page [http://www.agronomy.org/](about:blank)

PPI web page  [http://www.ppi-far.org](about:blank)

National Conservation Research Service web page [http://www.il.nrcs.usda.gov](about:blank)

University of Minnesota web page [http://www.soils.umn.edularchive/imageslimages/thumbs](about:blank)

NRCS web soil survey

Math & Calculations for Agronomy and Soil Scientists, [www.ipni.net](about:blank)

Penn State University soils website.

Soil eLibrary  [https://passel.unl.edu](about:blank)

Soil Orders [http://www.cals.uidaho.edu/soilorders/](about:blank)

News Prairie Press [https://newprairiepress.org/ebooks/39/](about:blank)

[https://www.soils4teachers.org/know-soil-know-life/](about:blank)

Agriculture Education Soil Curriculim [www.ilaged.org](about:blank)

Ilhmp lidar- [Illinois Height Modernization (ILHMP) LiDAR Data (arcgis.com)](about:blank)

**Hands-On Learning Activities:**

RealityWorks- Plastic Soil Monoliths

Conservation Demonstrations- Rainfall Simulator [www.rainfallsimulator.com](about:blank)

ISCA Soil Texture Kit

ADDITIONAL RESOURCES- NEED TO COPY FROM IL AG ED WEBSITE [https://www.ilaged.org/page.aspx?ID=4739](about:blank)