

# AGPS 001: SOILS & PLANT NUTRITION

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**Originator**

evaca

**Justification / Rationale**

Post pandemic analysis reveals that online lab courses do not give the students the proper instruction they need in this area.

**Effective Term**

Spring 2023

**Credit Status**

Credit - Degree Applicable

**Subject**

AGPS - Agriculture/Plant Science

**Course Number**

001

**Full Course Title**

Soils &amp; Plant Nutrition

**Short Title**

SOILS/PLANT NUTRTION

**Discipline****Disciplines List**

Agriculture

**Modality**

Face-to-Face

Hybrid

**Catalog Description**

This lecture and laboratory course covers soil derivation, classification, texture, structure, water movement and measurement, organic matter, microorganisms, sampling techniques, pH, salinity, reclamation and tillage. Also included are soil survey reports and maps, basic soil chemistry, essential plant nutrients, soil analysis, and fertilizers.

**Schedule Description**

This lecture and laboratory course covers soil derivation, classification, texture, structure, water movement and measurement, organic matter, microorganisms, sampling techniques, pH, salinity, reclamation and tillage. Advisory: MATH 060

**Lecture Units**

3

**Lecture Semester Hours**

54

**Lab Units**

1

**Lab Semester Hours**

54

**In-class Hours**

108

**Out-of-class Hours**

108

**Total Course Units**

4

**Total Semester Hours**

216

**Prerequisite Course(s)**

Advisory: MATH 060

**Required Text and Other Instructional Materials****Resource Type**

Book

**Author**

Plaster, E.

**Title**

Soils and Plant Nutrition

**Edition**

Revised

**City**

Clifton Park, NY

**Publisher**

Delmar Learning/Thomson Learning, Inc.

**Year**

2010

**College Level**

Yes

**Flesch-Kincaid Level**

11.8

**ISBN #**

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**Class Size Maximum**

26

**Entrance Skills**

Apply the basic operations appropriately to solve application problems that involve their use.

**Requisite Course Objectives**

MATH 060-Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and decimal form.

MATH 060-Apply methods of conversion between percents, decimals, and fractions.

MATH 060-Recognize and convert between units of measurements in the American and metric systems.

MATH 060-Use unit measure appropriately in applications.

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**Course Content**

1. The soil around us
  - a. The function of soils in our ecosystem
  - b. Early agrarian societies and their soil management practices, including significant historical events

- c. The soil as a natural body, an overview of its features and functions
- d. The scientific aspects of soil science, applied research present and future
- 2. Formation of soils from parent materials
  - a. Parent rocks and the influence on soil
  - b. Factors influencing soil formation
  - c. Soil formation in action
- 3. Soil classification
  - a. Soil orders
  - b. Categories and nomenclature of soil taxonomy
  - c. Soil series and textural classes
  - d. Storie index and land capability classes
    - i. Soil physical properties
      - 1. Texture
      - 2. Structure
      - 3. Color
      - 4. pH
      - 5. Profile
      - 6. Bulk density
      - 7. Particle density
      - 8. Pore space
- 4. Soil management as applied to physical properties
  - a. Interpretation and use of soil maps
  - b. Remote sensing tools for soil investigations
    - i. Satellite imagery
    - ii. County soil survey reports and their utilization
    - iii. Geographic Information Systems (GIS)
  - c. Organic material and microbiology of soils
  - d. Influence of organic material in the soil complex
    - i. Composting
    - ii. Diversity of soil organisms
    - iii. Influence of soil microorganisms
    - iv. The soil environment and organisms and organic matter
    - v. Soil nutrient cycles
    - vi. Concept of a sustainable soil system
  - vii. Soil moisture
    - 1. The hydrological cycle
    - 2. The soil plant atmosphere continuum
    - 3. Relation to texture, structure, and organic material in the soil
  - viii. Retention and movement in the soil
  - ix. Soil drainage
    - x. Irrigation requirements and practices in relation to soil
  - xi. Water quality influence and assessment
  - xii. Water conservation applications
  - xiii. Soil colloids
  - xiv. Properties and type of colloids
    - xv. Genesis of soil colloids
    - xvi. Cation exchange capacity
  - xvii. Factors influencing the availability of micronutrient cations and anions
  - xviii. Soil analysis
    - xix. Soil pH
    - xx. Assessment
    - xxi. Management of acidic soils
    - xxii. Management and reclamation of saline-alkaline soils
    - xxiii. Global soil quality as affected by human activities
- 5. Laboratory Activities

- a. Individual Laboratory Activities may include but are not limited to:
  - i. Categories and nomenclature of soil taxonomy
  - ii. Particle Size distribution
  - iii. Soil Structure, Texture, Color
  - iv. Interpretation and usage of soil maps
  - v. Organic materials and micro biology of soils
  - vi. Soil Moisture
  - vii. Soil Analysis and Management
  - viii. Soil Ecosystems
  - ix. Soil Chemistry

### Lab Content

1. A familiarity with basic laboratory equipment i.e. balances, glassware.
2. Soil surveying of local soil series
3. Experiments with fertilizer deficiencies in common horticultural crops
4. Texture analysis by several laboratory procedures
5. A study of soil micro-organisms
6. Water relationship with different soils i.e. soil moisture, capillary action and infiltration
7. Soil sampling, testing, and analysis
8. C.E.C. interpretation and soil fertility
9. Fertilizer programs for different local horticultural crops
10. Class presentations of various soil topics

### Course Objectives

Objectives	
Objective 1	Analyze local soil quality as affected by human and natural activities.
Objective 2	Explain local geographical features and their relationship to local soils.
Objective 3	Evaluate parent rocks and other soil forming processes influence on local and global soils
Objective 4	Demonstrate the determination of the following soil physical properties: textures (two methods), use of texture triangle, bulk density, particle density, pore space, organic content, color, pH, structure, conductivity and reactivity.
Objective 5	Demonstrate an understanding of the classification of local and global soil orders (i.e., soil taxonomy).
Objective 6	Discuss and understand the importance of essential plant nutrients
Objective 7	Apply soil nutrient cycles to soil, plant, and soil organism relationships
Objective 8	Demonstrate an ability to use appropriate terminology professionally when discussing soils
Objective 9	Demonstrate practical soil management including soil conservation and sustainability
Objective 10	Analyze a soil's microbiological activity level
Objective 11	Demonstrate an understanding of a soil food web.
Objective 12	Describe the Demonstrate how to read a soil map, explain the importance of soil mapping and how to locate a specific site using both township/range and GIS (Geographic Information Systems).
Objective 13	Demonstrate how to determine a Soil Storie Index Rating and a Natural Resources Conservation Service land capability class.
Objective 14	Describe the organic breakdown cycle of a soil and the role of organisms in soil physical and chemical properties
Objective 15	Evaluate a soil's water holding capacity, plant available water, properties and movement of water in soil.

### Student Learning Outcomes

Upon satisfactory completion of this course, students will be able to:	
Outcome 1	Identify the various soil separates and soil series found in the local desert environment.
Outcome 2	Demonstrate various methods of testing soil samples to then develop recommendations for soil modification or enhancement.
Outcome 3	Demonstrate practical soil management.

**Methods of Instruction**

Method	Please provide a description or examples of how each instructional method will be used in this course.
Experiential	n/a
Discussion	Topics pertaining to the weeks chapter will be discussed during class or can be assigned as an assignment.
Demonstration, Repetition/Practice	This will be demonstrated by weekly quizzes and by application during weekly labs.
Participation	Student participation will consist of completing weekly labs and may also consist of weekly online discussions.
Observation	The student will be observed and monitor by weekly quizzes and laboratories.
Lecture	Lecture will be conducted online through recorded lectures with aid of power points and extra online content.
Other (Specify)	Interpret text and provide scientific proof of concepts. Reading assignments – with end of chapter reviews to demonstrate student comprehension of text. Student participation in lab exercises – demonstrates clarity of concept and understanding of scientific method. Students will have opportunities to work as partners and in small groups. Some sessions will involve field observations and exercises.

**Methods of Evaluation**

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	The student will assigned homework found on their class canvas shell. The student will be responsible to submit the assignment in the manner requested.	In and Out of Class
Other	Lab reports are required.	In Class Only
Self-paced testing	Self-paced testing will be conducted out of class.	Out of Class Only
Student participation/contribution	Student participation and contribution will conducted by participating in class lab assignments, homework, and weekly discussions.	In and Out of Class
Mid-term and final evaluations	They will be conducted in person during the lab and out of class during examinations.	In Class Only
Tests/Quizzes/Examinations	Test/Quizzes/Examinations will be given in and out of class. The test, quizzes and exams will consist of visual and or written exams.	In and Out of Class
Presentations/student demonstration observations	Students will be responsible to present on a topic regarding the class. The presentation may be in person or a recorded presentation if online.	In and Out of Class
Laboratory projects	The laboratory projects will consist of hands on experiments based around the weekly topic.	In Class Only
Term or research papers	Students will be responsible to write a term paper on a topic regarding the classes lectures. The term paper may be asked to be submitted in person or online.	In and Out of Class

**Assignments**
**Other In-class Assignments**

- Reading and writing on lab exercises and reports
- Develop writing responses to questions designed to stimulate problem solving approaches
- Presentation of lab analysis to class
- Evaluate effectiveness of laboratory procedure by laboratory exercise outcome
- Conduct soil analysis and soil profile in field.

**Other Out-of-class Assignments**

- a. Read assigned chapters in textbook

**Grade Methods**

Letter Grade Only

**Distance Education Checklist**

Include the percentage of online and on-campus instruction you anticipate.

**Online %**

100

**Instructional Materials and Resources**

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?

N/A

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.

N/A

**Effective Student/Faculty Contact**

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

**Within Course Management System:**

Chat room/instant messaging  
Discussion forums with substantive instructor participation  
Online quizzes and examinations  
Timely feedback and return of student work as specified in the syllabus  
Video or audio feedback

**External to Course Management System:**

Direct e-mail  
Posted audio/video (including YouTube, 3cm mediasolutions, etc.)  
Telephone contact/voicemail

**For hybrid courses:**

Orientation, study, and/or review sessions  
Scheduled Face-to-Face group or individual meetings

**Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.**

The methods to maintain Regular Effective Contact were chosen because those are the same methods, we currently use in our face to face and online courses. These methods were also selected since it establishes a clear line of communication between instructor and students. They can also clarify any areas of misunderstanding that can be a cause of using one method of contact. The last reason is to provide an option for nonconventional students who might have trouble on how the class is being managed or the modality of the class.

**If interacting with students outside the LMS, explain how additional interactions with students outside the LMS will enhance student learning.**

N/A

**Other Information**

**Provide any other relevant information that will help the Curriculum Committee assess the viability of offering this course in an online or hybrid modality.**

Offering a hybrid modality would provide both traditional and nontraditional students flexibility to their schedule. Hybrid modality would also open opportunities to agriculture students who were not able to commit to full time class schedule due to work and family commitments.

## MIS Course Data

**CIP Code**

01.0304 - Crop Production.

**TOP Code**

010300 - Plant Science

**SAM Code**

D - Possibly Occupational

**Basic Skills Status**

Not Basic Skills

**Prior College Level**

Not applicable

**Cooperative Work Experience**

Not a Coop Course

**Course Classification Status**

Credit Course

**Approved Special Class**

Not special class

**Noncredit Category**

Not Applicable, Credit Course

**Funding Agency Category**

Not Applicable

**Program Status**

Program Applicable

**Transfer Status**

Transferable to both UC and CSU

**C-ID**

AG-PS 128L

**Allow Audit**

No

**Repeatability**

No

**Materials Fee**

No

**Additional Fees?**

No

## Approvals

**Curriculum Committee Approval Date**

11/01/2022

**Academic Senate Approval Date**

11/10/2022

**Board of Trustees Approval Date**

12/16/2022

**Course Control Number**

CCC000256971

**Programs referencing this course**

Agri-Business AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=46>)  
Environmental Horticulture AS Degree (employment preparation) (<http://catalog.collegeofthedesert.eduundefined/?key=47>)  
Environmental Horticulture AS Degree (transfer preparation) (<http://catalog.collegeofthedesert.eduundefined/?key=48>)  
General Agriculture AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=49>)  
Turfgrass Management AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=50>)  
Natural Resources AS Degree (employment preparation) (<http://catalog.collegeofthedesert.eduundefined/?key=70>)  
Natural Resources AS Degree (transfer preparation) (<http://catalog.collegeofthedesert.eduundefined/?key=71>)  
Agriculture Food Safety Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=83>)  
Agriculture Office Assistant Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=84>)  
Agriculture Office Professional Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=85>)  
Agriculture Pest Management Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=86>)  
Agriculture Technician Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=87>)  
Agriculture Plant Science AS-T Degree (<http://catalog.collegeofthedesert.eduundefined/?key=89>)  
Environmental Horticulture Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=90>)  
Agriculture Irrigation Technician Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=91>)  
Pest Management Technician Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=93>)  
Plant Science AS Degree (employment preparation) (<http://catalog.collegeofthedesert.eduundefined/?key=94>)  
Turfgrass Management Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=95>)