I. OVERVIEW

The following information will appear in the 2009 - 2010 catalog

NR 200  Soils  4 Units

Study of soil derivation, classification and characteristics as related to natural and human systems. Soil as a natural system including chemistry, ecology and geology. Soil use and management including erosion, moisture retention, structure, cultivation and organic matter. Special emphasis placed on the relationship between natural and agronomic soil systems. Laboratory topics include soil type, classification, soil chemistry, water and nutrient management and soil microbiology.

Field trips are required.  (A-F Only) Lecture /Lab

Transfer: (CSU, UC) General Education: (MJC-GE: A ) (CSU-GE: B1, B3 ) (IGETC: 5A )

II. LEARNING CONTEXT

Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:

   A. The soil around us
      1. The function of soils in our ecosystem
      2. Early agrarian societies and their soil management practices, including significant historical events
      3. The soil as an environmental interface
      4. The scientific aspects of soil science, applied research present and future

   B. Formation of soils from parent materials
      1. Weathering of rocks and minerals
      2. Factors influence soil formation
      3. Soil formation in action

   C. Soil classification
      1. Soil orders
      2. Categories and nomenclature of soil taxonomy
      3. Soil series and textural classes

   4. Storie index and land capability classes

   D. Soil physical properties
      1. Texture
      2. Structure
      3. Color
      4. pH
      5. Profile
      6. Bulk density
      7. Particle density
      8. Pore space
      9. Soil management as applied to physical properties

   E. Interpretation and use of soil maps
      1. Remote sensing tools for soil investigations
      2. Satellite imagery
      3. County soil survey reports and their utilization

   4. Geographic Information Systems (GIS) as applied to soils and soil mapping

   F. Organic material and microbiology of soils
      1. Influence of organic material in the soil complex
      2. Composting
3. Diversity of soil organisms
4. Influence of soil microorganisms
5. The soil environment and organisms and organic matter
6. Soil nutrient cycles
7. Concept of a sustainable soil system; the soil food web
G. Soil and the hydrologic cycle
   1. The hydrological cycle
   2. The soil plant atmosphere continuum
   3. Relation to texture, structure, and organic material in the soil
   4. Water retention and movement in the soil
   5. Soil drainage
   6. Precipitation and irrigation water
   7. Water quality influence and assessment
8. Water conservation applications
9. Local and regional water issues
H. Soil colloids
   1. Properties and type of colloids
   2. Genesis of soil colloids
   3. Cation exchange capacity
   4. Factors influencing the availability of micronutrient cations and anions
   5. Soil analysis
I. Soil pH
   1. Assessment
   2. Management of acidic soils
   3. Management and reclamation of saline-alkaline soils
J. Global soil quality as affected by human activities

B. HOURS AND UNITS

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C. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. Lecture, discussion, reading and writing, and lab experiments.
2. Photographic slides, videos and power point presentations to supplement lecture.
3. “Hands-on” analytical field trips.
4. Hypothesizing and applying other aspects of scientific method in problem solving.
5. Writing assignments emphasizing descriptive, analytical, and evaluative skills.
7. Comparing and interpreting individual and group results.

D. ASSIGNMENTS (TYPICAL)

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**
   
   Time spent on coursework in addition to hours of instruction (lecture hours)

2. **EVIDENCE OF CRITICAL THINKING**
   
   Assignments require the appropriate level of critical thinking
E. **TEXTS AND OTHER READINGS (TYPICAL)**


2. **Other**: Readings from soil industry magazines, journals, articles: Storie Index, Soil Quality Manual, and soil science news articles.

III. **DESIRED LEARNING**

A. **COURSE GOAL**

As a result of satisfactory completion of this course, the student should be prepared to:

B. **STUDENT LEARNING GOALS**

Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. **Required Learning Goals**

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

   a. Analyze local soil quality as affected by human and natural activities.

   b. Explain local geographical features and their relationship to local soils.

   c. Evaluate parent rocks and other soil forming processes influence on local and global soils.

   d. 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.

   e. Demonstrate an understanding of the classification of local and global soil orders (i.e., soil taxonomy).

   f. Analyze water and nutrient management in soils.

   g. Apply soil nutrient cycles to soil, plant, and soil organism relationships.

   h. Demonstrate an ability to use appropriate terminology when discussing soils.

   i. Demonstrate practical soil management including soil conversion and sustainability.

   j. Analyze a soil’s microbiological activity level.

   k. Demonstrate an understanding of a soil food web.

   l. Describe the features of a soil profile and relate such to soil management practices.

   m. 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).

   n. Demonstrate how to determine a Soil Storie Index Rating and a Natural Resources Conservation Service land capability class.

   o. Describe the organic breakdown cycle of a soil and the role of organisms in soil physical and chemical properties.

   p. Evaluate a soil’s water holding capacity, plant available water, properties and movement of water in soil.

   q. Assess and evaluate the anion and cation exchange capacity for a given soil.

   r. Interpret a soil nutrient analysis including percent base saturation.

   s. Demonstrate the use of the scientific method when validating and/or experimenting on the
principles of soil science.

t. Evaluate a soil anywhere in the world on its physical properties and make substantive recommendations on how to manage that soil.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. SUMMATIVE ASSESSMENT

1. In class objective examinations that test for definitions and major soil science concepts.

2. Out of class assignments that test for the understanding of major concepts including:
   1. Extensive laboratory write-ups.
   2. Detailed soil analysis reports.
   3. Participation in field trips.
   4. Participation in class project demonstrations.

3. Supplementary activities
   1. Participation in classroom/laboratory simulations that demonstration soil science principles.
   2. Library and on-line research on topics relating to soil science.