1. Course number and name
   ENGR 430 Soil Mechanics

2. Credits and contact hours
   3 Credit Hours

3. Instructor's or course coordinator's name
   Instructor: T.B. D'Orazio, Professor of Civil Engineering
   Course coordinator: T.B. D'Orazio, Professor of Civil Engineering

4. Text book, title, author, and year

   a. other supplemental materials
      None.

5. Specific course information
   a. brief description of the content of the course (catalog description)
      Soil as an engineering material with emphasis on identification, physical and mechanical
      properties. Evaluation of water flow through soil, settlement, soil strength, earth
      pressures, pile pullout capacity, and basic slope stability. Laboratory based term project.
      Two hours lecture and three hours lab per week.

   b. prerequisites or co-requisites
      ENGR. 309

   c. indicate whether a required, elective, or selected elective course in the program
      Required for Civil Engineering.

6. Specific goals for the course
   a. specific outcomes of instruction, ex. The student will be able to explain the significance of
      current research about a particular topic.
      - The student will demonstrate an ability to visually identify and classify soils.
      - The student will demonstrate an ability to classify soils based on the results of
        laboratory tests.
      - The student will demonstrate an ability to perform fundamental soil laboratory tests.
      - The student will demonstrate an ability to evaluate and present the results of
        fundamental soil laboratory tests.
      - The student will demonstrate an ability to describe basic soil compaction
        specifications in terms of maximum dry density and optimum water content based on
        the results of laboratory compaction tests.
      - The student will demonstrate an ability to evaluate some lab or in situ test results
        probabilistically.
The student will demonstrate an ability to recognize and describe potential problems at a particular site given a soil profile and other environmental type information.

The student will demonstrate an ability to propose and develop solutions to geotechnical problems and understand their impact on the surroundings.

The student will demonstrate an ability to calculate in situ total and effective stress from standard soil profile information.

The student will demonstrate an ability to evaluate consolidation properties from the results of consolidation tests.

The student will demonstrate an ability to evaluate settlement given load and soil property information.

The student will demonstrate an ability to determine soil strength parameters based on the results of strength tests.

The student will demonstrate an ability to evaluate the pullout capacity of piles based on soil strength information.

The student will demonstrate an ability to evaluate some cases of undrained slope stability and horizontal earth pressure.

explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcome(s): a, b, c, e, f, g, h, k.

7. Brief list of topics to be covered

- Clay mineralogy
- Clay structure, sand structure, soil formation
- Soils used for construction materials
- Flow through soils, flow nets, permeability testing
- Stresses in soil with depth in a soil deposit
- Effective stresses under conditions of flow
- Consolidation of clay
- Sand strength
- Clay strength
- Pile pullout capacity
- Evaluation of undrained slope stability and lateral earth pressures for some cases
- Evaluating lab or in situ test results probabilistically