

CEE 682
Foundation Engineering II

Catalog data: 20-CEE-682. Foundation Engineering II. 3 ug./gr. cr. Structural analysis and design of footings using ACI Code; pedestals, bearing plates, anchor bolts; square, rectangular, combined and mat foundations; pile caps; concrete cantilever retaining walls; case histories.

Prerequisites: 20-CEE-482 Reinforced Concrete (required); 20-CEE-681 Foundation Engineering I (recommended)

Textbook: None

Reference: *Building Code Requirements for Structural Concrete* (ACI 318-02) and *Commentary* (ACI 318-02R), American Concrete Institute, 2002.

Coordinator: Mark T. Bowers, PhD, PE, Associate Professor of Civil Engineering, 665 Baldwin Hall, 556-5425, Mark.Bowers@UC.Edu

Goals: To extend the student's knowledge of reinforced concrete into the area of the interface between a structural building and the foundation soil and rock as concerns the design and construction of footings with various shapes and loadings. Various methods are used to meet these objectives including classroom lectures, homework including hand and computer solutions, field trips to construction sites, attendance at seminars, and video presentations.

Lecture or lab topics:

1. General considerations, types of footings, design criteria. (3 classes)
2. Square column footings—centrically loaded, reinforced. (3 classes)
3. Square column footings with moment; pedestals, bearing plates, anchor bolts. (3 classes)
4. Rectangular footings; eccentrically loaded footings. (3 classes)
5. Wall footings with and without column loadings. (3 classes)
6. Combined footings. (3 classes)
7. Mat foundations. (3 classes)
8. Pile caps. (1 class)
9. Concrete cantilever retaining walls. (3 classes)
10. Case histories. (3 classes)
11. In class exams. (2 classes)

Computer usage: Demonstrated after hand solutions are completed.

ABET criterion 3: a, c, e, f, h, i, j, k

ABET criterion 8: a, b, d

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Specific Examples of ABET Criterion 3

- a The course depends upon a solid background in soil mechanics and reinforced concrete fundamentals. The student is required to submit solutions to 5 to 6 design problems (these are somewhat open-ended).
- c The homework sets involve practical problems, often from the professor's consulting experience. The focus is the design of foundations to solve structural engineering demands.
- e The class lecture and homework sets assist the student in the solution of the problem. The homework sets are somewhat open-ended to allow the students to experience real decision-making.
- f Professional and ethical responsibility are stressed. The ACI and AISC Codes are constantly referred to. Case histories of both failure and success are shared.
- h The impact of our designs is discussed in a societal context including aesthetics, costs, benefits, and problems.
- i The need for life-long learning is stressed. It is taught that codes change as new information is brought to light.
- j Contemporary issues are discussed as new topics are introduced. Field trips to campus construction sites are used whenever possible to demonstrate issues discussed in class.
- k The class requires the student to develop the ability to employ Codes, equations, design charts, and licensed software. Judgment through experience is stressed.