**CGN 4905/6905 – Ground Modification Design**  
3 Credits – Spring 2019

**Description:** Introduction to design of ground modification techniques for improvement of marginal construction sites.

**Prerequisites:** CEG 4011, CEG 4012 or equivalent

**Objectives:** Assure students can identify advantages, limitations, and appropriate selection of ground modification techniques, as well as design considerations for different ground modification techniques.

**Instructor:** Dr. Ana Mohseni  
Office: 265G Weil Hall  
Phone: (352) 294-7766  
email: amohseni@ufl.edu

**Office Hours:** F – 1:55 – 2:45 PM Tur 2328

**Text and Notes:**
- A Compendium of Ground Modifications Techniques by Townsend and Anderson (available in PDF on Canvas)
- Soil Improvement and Ground Modification Methods by Peter G. Nicholson
- Principles and Practice of Ground Improvement by Jie Han
- Ground Improvement Case Histories by Indraratna, Chu and Rujikiatkamjorn

**Grading:** Exams – 3 = 60%  
Homeworks – 4 = 15%  
Seminar – 1 = 25%  

Final letter grades will be assigned based on the following scale:

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<th>Grade</th>
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<td>A</td>
<td>94</td>
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<td>A-</td>
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<td>B+</td>
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“Graduate students need an overall GPA of 3.00 truncated and a 3.00 truncated GPA in their major (and in the minor, if a minor is declared) at graduation.” For more information on grades and grading policies, please visit: http://gradcatalog.ufl.edu/content.php?catoid=4&navoid=907#grades

**Assignments:** There will be 4 homeworks along the semester and they will be due at the beginning of the lecture of the due date; no later than 11:45 AM. These rules apply unless advance written notice has been submitted to the instructor for valid excuses.

**Exams:** Dates for the exams are provided in the course outline table. Exams will be given in-class on a one hour period. Each exam will concentrate on the material most recently covered. No open notes during exam. Do not miss an exam unless you have a valid excuse. Make-up exams will only be rescheduled if prior approval is granted and the student must make a reasonable attempt to take the exam prior to the scheduled exam date.

**Seminar:** Each student will write a report about a site where one of the techniques learned during the semester for soils improvement was applied. Each student will present a seminar about the report. Both the seminar and the report are individual. Each student should choose a different site.

**Class attendance:** Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

**Honesty Policy:** All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Note: that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

See http://www.dso.ufl.edu/scrr/procedures/honorcode.php

**Accommodation for Students with Disabilities:** Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

**UF Counseling Services:** –Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

**Software Use:** All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.
Outline

1. Introduction to ground modification methods
   Overview of modification techniques
2. Compaction
   Review of compaction, laboratory procedures, field compaction, properties of compacted cohesive soils, specification
3. Deep dynamic compaction
   Introduction, applications, suitability, assess site restraints, examples, specifications, case history
4. Preloading
   Prefabricated drains, theory, example, radial drainage
5. Stone columns
   Description, in-situ ground reinforcement, types, feasibility, design, bearing capacity, settlements improvement, design verification, cost data, budget estimate, case history, contracting methods, specifications
TEST 1
6. Soil stabilization
   Introduction, lime modification vs. stabilization, soil-lime and soil-cement reactions and benefits, lime-fly ash and cement-fly ash reactions, mix design, properties of soil-lime mixtures, constructions considerations
7. Grouting
   Introduction, applications, slope stabilization, feasibility, engineering considerations
8. Jet grouting
   Introduction, applications, advantages, soil compatibility, properties
9. Deep soil mixing
   Purpose, history, applications, characteristics, design concepts, lime columns, constructions methods and equipment, quality control and tests, cost
TEST 2
10. MSE walls
    History, applications, construction sequence, backfill materials, theory, design procedure, preliminary sizing, lateral earth pressures, design example, external stability, cost
11. Reinforced soil slopes
    Introduction, advantages, disadvantages, geosynthetic reinforcement, construction, cost estimates, design
12. Soil nailing
    History, overview, costs, FHWA design charts, design of structures, example, specification
TEST 3
SEMINARS (Last week of classes)