**Ground Modification Methods**  
**CE 8423-I**

Course Outline  
Fall 2017

**Instructor**  
Dr. Antonio Marinucci, MBA, PE, M.ASCE  
Email: [antonio.marinucci@nyu.edu](mailto:antonio.marinucci@nyu.edu) (preferred: antmarinucci@gmail.com)  
Mobile: (401) 261-9102

**Course Time**  
Mondays, 6:00 pm – 9:00 pm  
*Room RHXXX*

**Substitute Class Times**  
Every effort will be made to maintain all the university scheduled class times. However, substitute classes are required to make up for snow emergencies, instructor out of town professional travel commitments, etc.

**Office Hours**  
I will generally be on campus about 1 hour prior to our scheduled class meeting time, but I do not have a designated on campus office. As such, it is best to schedule an appointment to meet and discuss any questions and/or concerns.

**Course Pre-Requisites**  
Graduate or Senior standing as well as successful completion of an introductory undergraduate courses in geotechnical engineering (soil mechanics) and foundation engineering (CE3153 & CE4173 or equivalent).

**Texts and References**

- Various FHWA design manuals will be referenced. Refer to [http://www.fhwa.dot.gov/bridge/](http://www.fhwa.dot.gov/bridge/)
COURSE DESCRIPTION, GOALS, AND OBJECTIVES

Description and Course Goals  This course is practical in nature, and the lessons contained herein will provide you with the knowledge of the state-of-the-practice design tools and construction methods and the ability to implement the latest ground modification methods and procedures. Specific goals of this course are to you recognize the applicability of different ground modification method(s) that could be employed to improve soil and rock deposits for enhanced engineering performance. For each of technique, you will develop an understanding of

- The interrelationship among soil origin, mineralogy, and classification
- Behavioral differences between coarse- and fine-grained soils
- Design concepts
- Construction methods and materials
- Quality control / quality assurance (QC/QA) principles
- Advantages, disadvantages, limitations, and applicable uses
- Costs and contracting methods and specifications

Objectives  At the end of this course, you will be able to:

- List the functions of different ground modification methods and technologies
- Determine the applicability of each ground modification method
- Identify required soil and rock properties necessary to perform basic designs
- Describe advantages, disadvantages and limitations
- Identify appropriate quality assurance methods
- Summarize key elements of contracting methods

You are encouraged and are expected to participate in class by asking questions and discussing the engineering issues involved. Additional objectives of this course are to help you develop your written and verbal communication skills, as well as to develop a sense of engineering judgment and critical thinking.

COURSE TOPICS

This course will cover the following topics, which are subject to change. Concepts such as risk, safety, costs, specifications, and QC/QA will be discussed and integrated into the course.

1. Introduction and Overview
2. Review of Site Characterization Methods
3. Consolidation and Densification Methods
   a. Consolidation
      a. Pre-compression (pre-loading)
      b. Pre-compression with Drainage
   b. Densification
      a. Shallow Compaction
      b. Deep Dynamic Compaction
      c. Vibro-Compaction
4. EXAM 1 (Site Characterization Methods and Consolidation & Densification Methods)
5. Replacement and Reinforcement Methods
   a. Replacement with Lightweight fill
b. Reinforcement
   a. Aggregate Columns
   b. Vibro-concrete Columns
   c. Column Supported Embankments
6. EXAM 2 (Replacement & Reinforcement Methods)
7. Admixture Solidification and Replacement Methods
   a. Deep Mixing Methods
   b. Soil and Rock Grouting
8. FINAL EXAM (comprehensive of all topics)

GRADING

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Project Report &amp; Presentation</td>
<td>20%</td>
</tr>
<tr>
<td>Homework &amp; Participation</td>
<td>10% (approximately 6 to 8)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

A ≥ 90%
B ≥ 80% but < 90%
C ≥ 70% but < 80%
D ≥ 60% but < 70%
F < 60% (Fail)

In Semester Exams  Exams given the semester will last about 1-1.5 hours. Time outside of class will be scheduled for these two examinations. The instructor and students will work together to find the best time, but will likely take place prior to a class lecture time. Make-up exams will be handled on a case-by-case basis, and will be granted only under extreme circumstances. A request for a make-up exam must be made in advance of the test date/time.

Final Exam  The final exams will be given in accordance with the exam schedule and policy established by the Department. No make-up exams will be allowed. More importantly, no one can pass the course without passing the final exam.

Project Report and Presentation  Because lecture time during the semester is limited to explore each topic to great depths and in intricate detail, the purpose of the semester project is to provide a means for you to learn about ground modification topic not covered during the class lectures. The goals of this project are to help you develop your written and verbal communication skills, and to assist in developing your individual research skills, critical thinking, and a sense of engineering judgment. Additional details about the project will be provided separately.

Homework  Homework is an integral part of understanding the material presented and discussed in this course. Assignments will be posted on the course website at one week prior to its due date, and are to be turned by the beginning of class on its assigned due date. Any
assignment turned in after the start of the lecture will be considered late, and will be assessed a 20% penalty for lateness. Once a homework assignment has been graded and returned, no further homework will be accepted for that assignment. The instructor may assign a failing grade to any student not turning in at least 70% of the homework assignments. While you are encouraged to work collaboratively in terms of understanding and learning the material, the actual work should be yours alone. Assignments will be graded based on completeness, professional appearance, organization and presentation (refer to Presentation Standards for Homework Assignments), clarity of procedure, and accuracy of numerical results.

Class Participation  Class participation will generally help your final grade, and I encourage you to ask questions that may benefit not just you, but also the class. In addition, I ask many questions to the class during my lectures for feedback on your understanding of concepts. Please respond, even if you are not sure of the answer; your participation indicates to me that you are awake and attentive. Please have a calculator, pencil, and paper handy so that you can complete basic computations when they arise.

Disruptions  Class disruptions, such as cell phone use, side conversations, rudeness / other non-professional behavior, tardiness, etc. will not be tolerated. If you continue to be disruptive after being specifically asked to stop, you will be asked to leave the class and not return until the next meeting. If several folks are disruptive, I will leave. Please be polite, professional, and courteous.

**COMPUTER FACILITIES**

I assume that everyone has access to a computer. NYU Polytechnic School of Engineering has a number of PC and Unix computer labs, which are equipped with standard business and engineering software. You are expected to use computers to present your work and encouraged to make use of Poly’s computer facilities if you do not own a computer.

**LIBRARY FACILITIES**

Bern Dibner Library at the Metrotech and Bobst library at Washington Square are available for your use. As a student at Poly, you have access to electronic search facilities through the library web page (library.poly.edu, library.nyu.edu). If a paper or a book is not available at the library, you can request that the librarian get you a copy by email or inter-library loan, respectively. The New York Public Library science section located at Madison and 34th in Manhattan is also a useful resource available to you.

**Moses Center Statement of Disability**

If you are student with a disability who is requesting accommodations, please contact New York University’s Moses Center for Students with Disabilities (CSD) at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.
ETHICS AND ACADEMIC INTEGRITY

Academic honesty is assumed of all students; a zero-tolerance policy will be enforced with respect to cheating, which is defined to include any act to misrepresent someone else’s work as your own. Anyone caught cheating will automatically fail this class. Please refer to “NYU School of Engineering Policies and Procedures on Academic Misconduct” for further details, which are summarized below.

NYU School of Engineering Policies and Procedures on Academic Misconduct

A. Introduction The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School’s rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School’s Policy on Academic Misconduct.

B. Definition Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:
1. Cheating intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person’s work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
2. Fabrication including but not limited to, falsifying experimental data and/or citations.
3. Plagiarism intentionally or knowingly representing the words or ideas of another as one’s own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
4. Unauthorized collaboration working together on work that was meant to be done individually.
5. Duplicating work presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
6. Forgery altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.