

Course identification

Course name:	SOIL/GROUND IMPROVEMENT TECHNIQUES
Prerequisites:	Undergraduate Geotechnical Engineering Courses
Lecture hours:	13:30 – 16:30 Wednesday

Instructor

Instructor:	Marolo C. Alfaro, PEng, PhD
Contact information:	Room E1-368, Phone: 474-8155, alfarom@cc.umanitoba.ca
Office hours:	By Appointment

Course description and learning outcomes

Background

The basic concept behind soil/ground improvement technologies is to improve or modify poor and marginal in-situ soil conditions to meet project foundation requirements. These soil/ground improvement technologies can be implemented to both new construction and rehabilitation of infrastructures.

General Objective

The aim of the course is to learn new methods and materials for reinforcing, treating and improving poor and unstable soil/ground.

Course web site

Your Jump Portal Server

Textbook

References

- (1) Hausmann, M.R., *Engineering Principles of Ground Modification*, McGraw-Hill, New Jersey, 1990.
- (2) Bergado, D.T., Chai, J.C., Alfaro, M.C. and Balasubramaniam, A.S., *Improvement Techniques of Soft Ground in Subsiding and Lowland Environment*, A.A. Balkema Publishers, Rotterdam, 1994.
- (3) Canadian Geotechnical Society, *Chapter 16: Site and Soil Improvement Techniques, Canadian Foundation Engineering Manual* (4th Edition), Bi-Tech Publishers, British Columbia, 2004.

Assignments/projects

Numerical problems will be assigned regularly. There will be a project work involving case histories. Grading scheme will be decided during the first day of classes.

Term tests	
To be decided during the first day of classes.	
Final exam	
There will be a 3-hour final examination.	
Assessment method	
To be decided during the first day of classes.	
Detailed course content	
1.	Introduction to Soil/Ground Improvement
2.	Densification and Compaction
	2.1 Surface Compaction
	2.2 Dynamic Deep Compaction
	2.3 Vibro-compaction and Vibro-replacement
3.	Soil Reinforcement
	3.1 Reinforced Soil
	3.2 Soil Nailing
	3.3 Stone Columns/Granular Piles
4.	Preloading and Drainage
	4.1 Preloading
	4.2 Use of Vertical Drains
	4.3 Electrokinetic Dewatering and Stabilization
5.	Admixtures and Ground Freezing
	5.1 Grouting
	5.2 Lime/Cement/Fly Ash Stabilization
	5.3 Ground freezing and Preservation of Permafrost