# Course identification

<table>
<thead>
<tr>
<th>Course name:</th>
<th>SOIL/GROUND IMPROVEMENT TECHNIQUES</th>
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<tbody>
<tr>
<td>Prerequisites:</td>
<td>Undergraduate Geotechnical Engineering Courses</td>
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<tr>
<td>Lecture hours:</td>
<td>13:30 – 16:30 Wednesday</td>
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## Instructor

<table>
<thead>
<tr>
<th>Instructor:</th>
<th>Marolo C. Alfaro, PEng, PhD</th>
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<tbody>
<tr>
<td>Contact information:</td>
<td>Room E1-368, Phone: 474-8155, <a href="mailto:alfarom@cc.umanitoba.ca">alfarom@cc.umanitoba.ca</a></td>
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<tr>
<td>Office hours:</td>
<td>By Appointment</td>
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## 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


## 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