Instructor: Dr. Mehrdad Razavi

Office Hours: Tuesday 3:00 PM to 5:00 PM  
Thursday 3:00 PM to 5:00 PM

Office: MSEC 288  
Phone: (575) 835-6447  
E-mail: Mehrdad@nmt.edu

Class Website: http://infohost.nmt.edu/~Mehrdad/foundation/

Class Schedule

Tuesday  
9:00 AM to 10:15 AM  MSEC 103

Thursday  
9:00 AM to 10:15 AM  MSEC 103

Teaching Assistant  
Ahmed Hussien  
email: ahussien@nmt.edu

Textbook

ISBN-10: 0-495-66810-9  

References

1. Lecture Handouts
6. ACI 318-08: Building Code Requirements for Structural Concrete and Commentary
Prerequisites

1. Soil Mechanics
2. Design of Concrete Structures (not mandatory)

Computer Programs You Need to Know

1. MS-Word or Pages (or any other word processing program)
2. MS-Excel or Numbers (or any other spreadsheet program)
3. MATLAB
4. AutoCAD (or any other Computer Aided Design program)

Course Outline

• Geotechnical Properties of the Soil (A Brief Review)
  – Grain Size Distribution
  – Weight-Volume Relationships
  – Relative Density
  – Atterberg Limits
  – Soil Classification
  – Hydraulic Conductivity of Soil
  – Steady State Seepage
  – Effective Stress
  – Shear Strength

• Consolidation
  – Consolidation Settlement
  – Time Rate of Consolidation

• Loading
  – Gravitational Loads
  – Lateral Loads
  – Load Combinations

• Approximate Structural Analysis Techniques
  – Degrees of freedom
  – Stability
  – Simple Connections
  – Rigid Connections
  – Internal Forces due to Gravitational Loads
  – Internal Forces due to Lateral Loads
• Shallow Foundations
  – Ultimate Bearing Capacity
  – Allowable Bearing Capacity
  – Spread Footings
  – Elastic Settlement
  – Consolidation Settlement
  – Combined Footings
  – Mat Foundations
• Lateral Earth Pressure
  – Active Pressure
  – Passive Pressure
• Retaining Structures
• Deep Foundations
  – Pile Foundations
  – Drilled-Shaft Foundations
• Slope Stability
• Special Considerations in Design and Construction of Foundations

Laboratory Tests

<table>
<thead>
<tr>
<th>No.</th>
<th>Test</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-D Consolidation</td>
<td>Determine Consolidation Parameters</td>
</tr>
<tr>
<td>2</td>
<td>Foundation Failure</td>
<td>Draw Failure Envelope</td>
</tr>
</tbody>
</table>

Homework Requirement

1. All homework assignments must be typed or handed in on engineering paper. The pages should be numbered and stapled together. Use computer to plot graphs.
2. Each problem should be clearly labeled and the solution should be presented in a logical manner. All solution steps should be included.
3. Each answer should be placed in a box.
4. All homework assignments will be due one week after the day it is assigned.

Design Project

The project includes design of foundations (and retaining structures) of a multi story residential building. The completed project due date is Thursday May 3, 2012. A hard copy and a CD including all computer files must be submitted.
Presentation (for Graduate Students Only)

Graduate students must prepare a 15 minutes presentation by using MS-Power Point (or Keynote). The suggested topics are:

1. Design of foundation for vibration
2. Foundation on expansive soils
3. Submerged Foundations
4. Computer programs for analysis and design of foundations
5. Foundation failure
6. Effect of the foundation shape on bearing capacity
7. Lateral earth pressure in earthquake
8. Foundation repair
9. Design of penstock supports
10. Base isolation

Grading

<table>
<thead>
<tr>
<th></th>
<th>CE 413</th>
<th>ME 531</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Exam (from Reading Assignments)</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Presentation</td>
<td>-</td>
<td>10%</td>
</tr>
<tr>
<td>Design Project</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Sunday</td>
<td>Monday</td>
<td>Tuesday</td>
</tr>
<tr>
<td>------------------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9:00 AM Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9:00 AM Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>9:00 AM Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>9:00 AM Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>9:00 AM Class</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- Foundation Engineering
- Tech Events