Course Outline

I. Introduction

II. Stress distributions and deformations around openings
   A. Elastic solutions
   B. Elasto-plastic solutions
   C. Ground reaction curves

III. Design of tunnel liners
   A. Types of support systems
   B. Factors affecting performance
   C. Ground-structure interaction
      1. Rigid and flexible liner responses
      2. Empirical solutions
      3. Relative stiffness solutions
   D. Recommended design procedures

IV. Soft ground tunnels
   A. Construction methods
      1. Advancing the tunnel
      2. Ground water control
   B. Ground movements
      1. Sources of movements
      2. Ground surface settlements
      3. Relation between movements into tunnel and ground surface settlements
   C. Case studies

V. Shafts
   A. Construction methods
      1. Supported excavations
      2. Self-sinking caissons
   B. Design methodology
   C. Case studies

VI. Design of openings in rock
   A. Rock classification for engineering purposes
   B. Unreinforced openings
   C. Reinforced openings
      1. Steel Sets
      2. Rock bolts
      3. Shotcrete
      4. NATM

Course Grading

Class participation 10%
Homework 20%
Midterm 20%
Final Exam 50%

Final exam is scheduled for Monday December 7