AIMS OF COURSE

The course aims to provide students with practical tools necessary for the design of deep & shallow foundations and for basements. Particular emphasis is placed on the use of simple design approaches employing appropriate soil parameters. Students will be exposed to typical commercial software used in foundation and basement design.

LECTURES (35)

1. INTRODUCTION (1)
Overview of foundation types and typical failure modes for foundations/walls

2. PARAMETER ASSESSMENT FOR FOUNDATION DESIGN (5)
Review of factors controlling soil stiffness and strength
Review of in-situ testing techniques
Parameter determination/correlations for clays, silts, sands and rocks
SLS and ULS design

3. WALL AND BASEMENT DESIGN (7)
Overview of typical walls/construction techniques
Embedded wall (short/long term) stability
Particular design issues for temporary and permanent works
Construction/detailing considerations for basement wall and support systems

4. BEARING CAPACITY OF SPREAD FOUNDATIONS (6)
Undrained and drained bearing capacity assessment for various conditions
Pull-out capacity of footings and anchors

5. SETTLEMENT PREDICTION FOR SPREAD FOUNDATIONS (4)
Elastic, empirical and non-linear elastic methods of analysis
Interaction of foundations

6. PILE FOUNDATIONS: AXIAL RESPONSE (6)
Pile types and construction considerations
Assessment of shaft and base capacity and stiffness
Static pile testing and dynamic capacity from stress wave measurements
7. **LATERAL RESPONSE OF PILES (2)**
   - Modes of collapse under lateral loading
   - Design charts for ultimate lateral capacity and lateral deformations

8. **PERFORMANCE OF PILE GROUPS AND PILED RAFTS (4)**
   - Failure modes of pile groups and principles of piled rafts
   - Elastic interaction between piles
   - Simplified and computer methods for analysis

**COMPUTER ANALYSIS & DESIGN DEMONSTRATIONS (4)**
- Wall stability
- Staged construction/SLS wall predictions/basement design
- Interaction of foundations
- Ground movement induced forces
- Redistribution in pile group analysis

**TUTORIAL SESSIONS (12)**
- 8 No. 1.5hour compulsory sessions

**Contact hours**
51 contact hours comprising 35 hrs of lectures, 4 hrs of computer demonstration and 12 hrs of tutorials. Attendance (at all) is *compulsory*.

**Assessment**
- Mid-semester exam: 10 %
- Computer assignments: 13 %
- Tutorials: 12 %
- End of semester exam: 65 %

Course notes, excluding all examples and the powerpoint presentations, will be provided in the exams.

**Unit co-ordinator:** Prof. Barry Lehan Rm. 1104d
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**Recommended Reading**

*Years 2011–2012*