**CIV E 489 SYLLABUS**

COURSE NAME: Geotechnical Design- CIV E 489  
DETAILS: 3 hour lectures, 3/1 hour Lab   
TERM: Winter

COURSE DESCRIPTION

\*4.5 (fi 8) (second term, 3-0-3) Evaluation of site conditions. Design and analysis of shallow and deep

foundations and retaining structures. Slope stability of embankments and cuts including foundation

excavations. Students work in teams on a design project.

REQUIRED MATERIAL

**Recommended**

Canadian Foundation Engineering Manual, 4rd Edition, 2006

Soil Mechanics in Engineering Practice, Terzaghi and Peck, Wiley, 1995

Foundation Engineering, Peck, Hanson and Thornburn, 2nd Edition, 1974

An Introduction to Geotechnical Engineering, Holtz, Kovacs and Sheahan, 2nd Edition, 2011

LECTURE CONTENT

**Lecture Topics**

1. Design in Geotechnical Engineering

2. Site Characterization in Geotechnical Engineering

3. Retaining Walls

3.1. Types & Construction practice in Edmonton

3.2. Passive and Active Anchor design

4. Slope Stability Methods

4.1. The role of the Factor of Safety

4.2. Limit Equilibrium Methods

4.3. Role of Soil Behaviour (Normally-consolidated vs Over-consolidated)

5. Embankment Design

5.1. Construction constraints and practice

5.2. Consolidation & Settlement

5.3. Short-term (temporary) and Long-term (permanent) Stability

6. Geosynthetics in Geotechnical Engineering

7. Frost Action & Drainage around excavations

8. Field Instrumentation and Monitoring

8.1. Its role

8.2. Types of Instruments

8.3. Example Applications

9. Peck’s Observational method in Design and Risk in Geotechnical Design

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| **Geotechnical Design Project Memorandums:** | **Due Date** |
| **Technical Memorandum 1**   1. Desk Study – 2. Geotechnical Design Basis: | Jan 20 |
| **Technical Memorandum 2**   1. Proposed Site Investigation Plan and expected costs 2. Potential construction options | Feb 03 |
| **Technical Memorandum 3**   1. Development of Geological Profile, and 2. Geotechnical Design parameters | Feb 24 |
| **Technical Memorandum 4**   1. Potential design solutions that will fit with the Geological profile and design parameters - Developed for particular design cross-sections 2. Scoping hand calculations to develop methodology and work flow needed   to support the design approach | Mar 09 |
| Numerical Analysis Software Workshop | Feb 29 |
| **Group Presentations** | Mar 02-06 |
| **Technical Memorandum 5**  Design solutions and detailed design analyses using the numerical software | Mar 23 |
| **Final Presentation:** | Apr 09 |
| **Final Report Due**  Final report includes results from Technical memorandum 1 through 5, plus   1. Planned instrumentation 2. Cost estimate for project | Apr 14 |

LAB CONTENT

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| **Geotechnical Design Labs/Tutorials** | **Due Date** |
| Lab 1: Effective Stress Review | Jan 13 |
| Lab 2: Site Investigation | Jan 27 |
| Lab 3: Shear strength | Feb 10 |
| Lab 4: Tensioned Anchors | Mar 02 |
| Lab 5: Embankment Design | Mar 16 |
| Lab 6: Pile Foundation Design | Mar 30 |