School of Civil & Resource Engineering, The University of Western Australia

SCHOOL OF CIVIL & RESOURCE ENGINEERING
GEOTECHNICAL & GEOENVIRONMENTAL ENGINEERING
(CIVL 4121)

LECTURERS

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UNIT WEB PAGE

Notes, handouts, assignment details, etc will be posted on the unit web page:  
http://www.civil.uwa.edu.au/teaching/CIVL4121. See also ‘Drive N:’ in the computer lab.  
The Class Email system will be used to alert students when new content is posted, and for other  
communications with regard to the unit. It will be assumed that students check email regularly (at least  
daily).

UNIT CONTENT

This unit deals with a variety of topics in geotechnical engineering and geoenvironmental engineering not  
covered elsewhere in the Civil Engineering course. It builds on material covered earlier in core units in  
geomechanics:

- CIVL 2121: sedimentation, clay mineralogy, permeability, 2D flow, flow nets
- CIVL 2122: consolidation, soil strength
- CIVL 3120: slope stability

OUTLINE

(note – order of topics may change)

Weeks 1 – 6 (26 July – 3 September): Professor Martin Fahey

1 Introduction
   - Overview of geotechnical input to civil & environmental works

2 Ground improvement
   - Assessment of liquefaction potential
   - Vibroflotation & vibro-replacement (‘stone columns’)
   - Deep (dynamic) compaction
   - Grouting
   - Pre-loading
   - Sand/wick drains

3 Compaction
   - Compaction equipment for field compaction
   - Laboratory compaction tests
   - Influence of compaction on soil properties

4 Embankment Dams
   - General configuration
   - Revision of clay mineralogy; dispersivity of clay, and its measurement
   - Design and construction of filters, drains & water cut-offs
   - Flow net construction in non-homogeneous and/or anisotropic conditions using manual methods and the computer code SEEP/W
Field measurement of permeability
- Permeability, hydraulic conductivity, transmissivity, storage coefficient & specific yield
- ‘Steady state’ pumping tests (revision)
- Transient pumping tests

Contaminant transport
- Advection, mechanical dispersion, diffusion, sorption
- The A-D equation and application of analytical solutions
- Numerical analysis

Weeks 7 – 11 (6 September – 13 October): Professor Andy Fourie
(details of contents will be provided at the start of this section)

7 Slope stability
8 Tailings disposal and storage facilities
9 Waste/tailings containment
10 Specific geo-environmental issues

Weeks 12 – 13 (15 October – 29 October): Professor Martin Fahey

11 Pavement Engineering

ASSESSMENT
End of semester exam (70%)
Tutorials and Assignments (30%)
Assignments will be ‘take away’ (with up to a week allowed for completion) and will consist of design or calculation problems, in some cases involving commercial software packages.

CONTACT HOURS
Six 1-hour sessions – three lectures and 3 tutorials – per week have been assigned to this unit, but not all of these will be used. Each of the two lecturers will have different arrangements. Ample notification of sessions that will not be used will be given by email.

Some of the material in some of the sessions will be recorded by Lectopia, but this is limited to material presented on Powerpoint. None of the Thursday sessions will be recorded (as the venue is not equipped appropriately).

RECOMMENDED READING / REFERENCE LIST
On-line manuals for CIRCLY, SEEP/W, SLOPE/W, CTRAN/W, etc.