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PDU points

## Public Seminar on

# Multiscale poromechanics: Fluid flow, solid deformation and anisotropic thermoplasticity

By **Prof. Ronaldo I. Borja**

Stanford University

### Synopsis:

Natural geomaterials often exhibit pore size distributions with two dominant porosity scales. Examples include fractured rocks where the dominant porosities are those of the fractures and rock matrix, and aggregated soils where the dominant porosities are those of the micropores and macropores. I will present a framework for this type of materials that covers both steady-state and transient fluid flow responses. The framework relies on a thermodynamically consistent effective stress previously developed for porous media with two dominant porosity scales. I will show that this effective stress is equivalent to the weighted sum of the individual effective stresses in the micropores and macropores, with the weighting done according to the pore fractions. Apart from this feature, some geomaterials such as shale exhibit pronounced anisotropy in their hydromechanical behavior due to the presence of distinct bedding planes. In this talk I will also present a thermo-plastic framework for transversely isotropic materials incorporating anisotropy and thermal effects in both elastic and plastic responses.

### About the Speaker:

Ronaldo Borja was born and raised in the Philippines. He obtained his Bachelor's degree in Civil Engineering from the University of the Philippines. He then attended Stanford University under a UNESCO Fellowship, where he obtained his Master of Science degree in Mechanical Engineering (Applied Mechanics) and Ph.D. in Civil Engineering. He returned briefly to the Philippines after the completion of his Ph.D., and then joined Stanford University's Civil Engineering Department as a faculty one year later. His main areas of research include theoretical and computational solid mechanics, geomechanics, and geosciences. Ronaldo Borja is the author of a textbook entitled Plasticity Modeling and Computation published by Springer. He currently serves as executive editor of two high-impact journals in his field, the International Journal for Numerical and Analytical Methods in Geomechanics published by Wiley, and Acta Geotechnica published by Springer. He is the recipient of the 2016 ASCE Maurice A. Biot Medal for his work in computational poromechanics.

**Date:** 26 Oct 2018 ( Friday )

**Time:** 10:00am – 11:00am ( Registration starts at 9:30am )

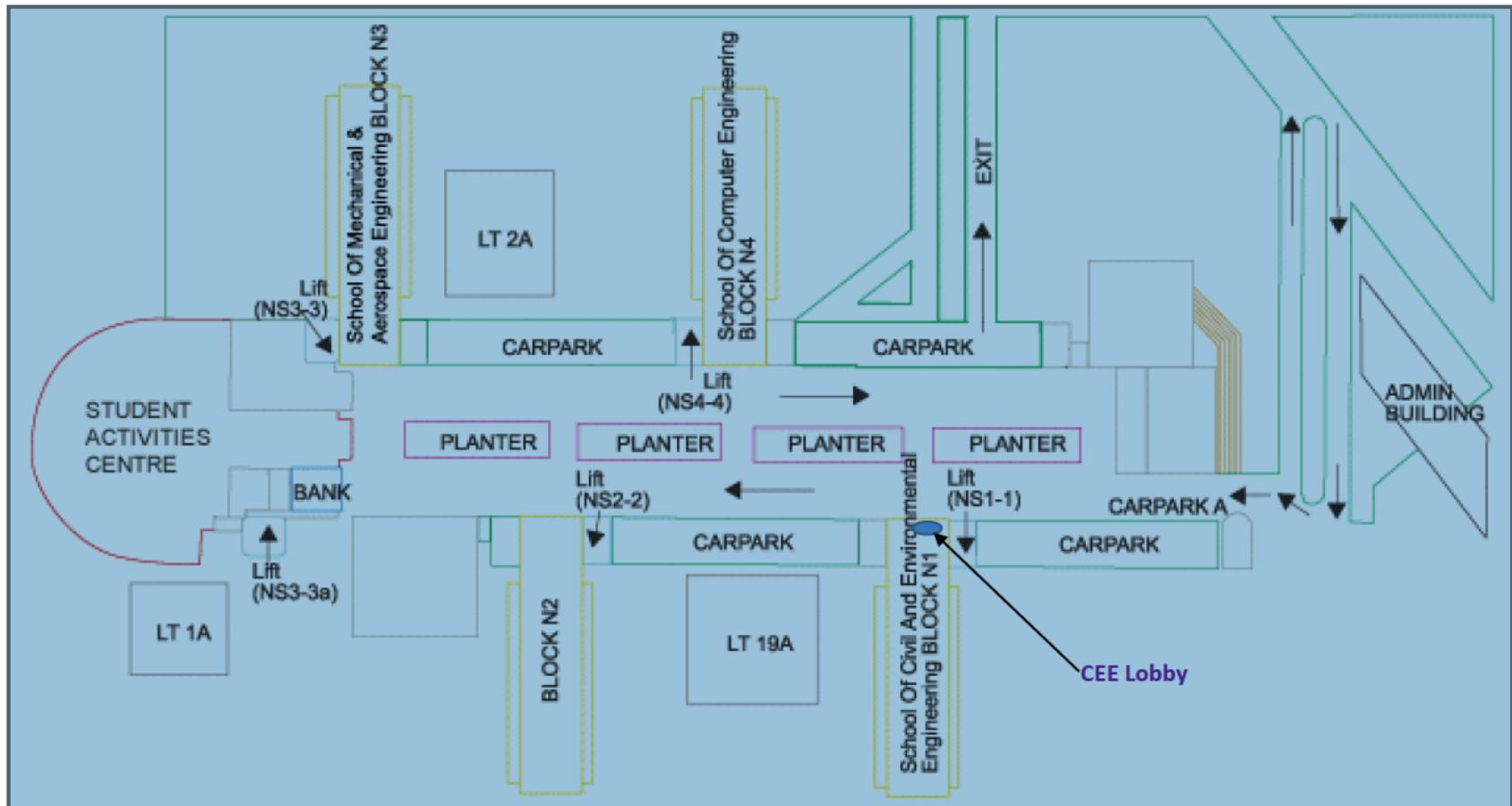
**Venue:** CEE Seminar Room A, Block N1, Level B1, N1-B1B-06 ( see [map](#) )

School of CEE, Nanyang Technological University

Click [here](#) to register by 24 Oct 18



## Seminar Room A



From CEE Lobby, walk till end of aisle and take the first passenger lift to Basement 1. Enter from ICRM entrance to Seminar Room A.

### Floorplan - N1\_B1\_B

