

## SHORT COURSE

Title:	Advances in probabilistic slope stability analysis and coupled climatic 1D/2D/3D finite element seepage modeling
Instructors:	Murray Fredlund, PhD, PEng, President/CEO, SoilVision Systems Ltd. Del Fredlund, PhD, PEng, Senior Geotechnical Engineering Specialist, Golder Associates.
Date:	September 30, 2008
Duration:	8:30am to 4:30pm
Fees:	Indian National - 15000 INR / 375 USD Student (Indian) - 10000 INR / 250 USD Foreign National - 20000 INR / 500 USD Student (Foreign) - 15000 INR / 375 USD

### Overview:

Significant advances have been made in the application of numerical models to practical problems in geotechnical engineering. This course covers advances in both the theoretical and practical application of probability theory to slope stability and seepage geotechnical problems. Case studies will also be examined which illustrate the complexity of back-analysis of classic slides such as the Lodalen slide by both 2D and 3D slope stability numerical methods. Application of statistical principles to seepage analysis will also be covered. In particular the following questions will be addressed:

### SLOPE STABILITY

- When is probability theory applicable to a certain application?
- Can probability theory be applied to practical problems?
- What are acceptable probabilistic safety indicators?
- How should spatial variation of soil properties be assessed?
- How much data is acceptable for a probabilistic slope stability analysis?
- What Poisson's ratio is appropriate to use in a particular analysis (and what is its effect on a slope stability analysis)?

### SEEPAGE

- How does mesh density affect my answers?
- What is the effect of mesh density on cover design analysis?
- What is the effect of mesh density on earth dam analysis?
- How does draw-down affect both pore-water pressures and stability?
- Present and Future Philosophy of Numerical Modeling in Geotechnical Engineering
- Bridging the Gap between Theory and Practice of Unsaturated Soil Mechanics,
- Saturated/Unsaturated Soil Behavior as a Series of Partial Differential Equations
- What are methods of checking for model "correctness"?
- What are advanced methods for solving "unsolvable" models?
- Why do many climatic models produce wrong results?
- How do climatic events affect slope stability?
- In what applications is automatic mesh refinement beneficial?

The course will also cover advances in the area of slope stability analysis in applying stochastic principles both materially and spatially to numerical models. A combination of classic limit equilibrium as well as more advanced stress-based numerical models will be covered in terms of their applicability to practical problems.

The applications of automatic mesh refinement techniques to practical problems in order to improve convergence and improve the accuracy of calculations will be discussed.



This course intends to provide the user with an overview of the practical applications of probabilistic principles both in slope stability numerical modeling as well as flow modeling of complex earth structures. Specific emphasis will be shown to the following applications:

- 2D and 3D earth dam flow and stress analysis
- Recharge calculations and earth cover design
- Flow underneath drainage walls
- Slope stability of unsaturated soil slopes
- Correct calculation of exit gradients in earth dam models
- 3D slope stability back-analysis of the Lodalen slide



# Order Form

Date: \_\_\_\_\_

## Order Description

\$US  \$INR

Item: Short course x (# of attendees) \_\_\_\_\_ \$ \_\_\_\_\_

Item: Short course x (# of attendees) \_\_\_\_\_ \$ \_\_\_\_\_

Item: Short course x (# of attendees) \_\_\_\_\_ \$ \_\_\_\_\_

TOTAL \$ \_\_\_\_\_

## Method of Payment

Cheque (outside Canada, cheque must be drawn on a U.S. bank)

Visa  Mastercard Card Number: \_\_\_\_\_

Name on Card: \_\_\_\_\_

Expiry Date: \_\_\_\_\_

Bank Transfer (outside Canada only)

Royal Bank, 8th & Goodwin Branch, 2802 - 8th St E, Saskatoon, Saskatchewan, S7H 0V9 Canada

Account #: 400 149 1 – Branch #: 00003 – Transit #: 07758 – SWIFT: 021 000021

**Please fill out the attached form and fax (or scan and email) back to**

**1-306-955-4575 - or -**

**murray@soilvision.com**