

## Analysis and Design of Slopes and Retaining Structures

Rocscience Inc. is offering a two-day training course for geotechnical engineers on the analysis and design of soil/rock slopes and retaining structures using the software tools *Slide*, *Phase<sup>2</sup>*, *Swedge* and *RocPlane*.

The course gives a practical approach to building models that realistically simulate the behaviour of slope and retaining structures. This comprehensive two-day training seminar specifically designed for companies seeking to enhance the modelling capabilities for slope stability problems to their engineers.



The training course will enable participants to broadly understand the relationships and differences between stability analysis methods, and their practical, efficient use. It will demonstrate the principles for using these methods on clear examples.

The analysis of the stability of slopes and retaining structures in soils and other granular materials requires the use of limiting equilibrium models or continuum mechanics approaches such as the finite element method. These approaches are also appropriate for modelling rotational failure in fractured rock slopes. The course will demonstrate their practical application to slope design and analysis through use of *Slide*, a 2-D limit-equilibrium program, and *Phase<sup>2</sup>*, a finite element code. It will investigate the advantages and limitations of different limit-equilibrium techniques. Participants will be introduced to the finite element modelling of slopes and its benefits such as the absence of assumptions on the shape or location of failure surfaces.

Four primary failure modes – rotational, planar, wedge and toppling failure – are possible in rock slopes. The training course will examine slope problems involving wedge and planar failure using two computer programs, *Swedge* and *RocPlane*. *Swedge* is a quick, interactive tool for evaluating the stability of surface wedges in rock slopes, defined by two intersecting discontinuity planes, a slope surface and an optional tension crack. *RocPlane* is designed to assist engineers in evaluating the stability of planar rock slopes, and in formulating effective strategies for improving stability. Through practical examples, participants will get to know the beneficial insights the two programs offer into slope behaviour and design.

## Course Contents

### ■ **Module I: Overview of Limit-equilibrium Methods for Slope Stability Analysis**

- Failure modes of soil and rock slopes
- Limit-equilibrium methods
- Overview of computer programs for limit-equilibrium analysis
- Organization of analysis tools and functionalities in *Slide*, *Swedge* and *RocPlane*

### ■ **Module II: Slope Stability Analysis with *Slide***

- Model building
- Material behaviour models
- Interpretation of results
- Verification of models

### ■ **Module III: Advanced Features**

- Selection of methods for locating minimum factor of safety
- Slope support and reinforcement measures
- Sensitivity and probabilistic analysis
- Common pitfalls in slope stability analysis

### ■ **Module IV: Groundwater Analysis**

- General concepts of FEM
- Overview of groundwater analysis
- Seepage analysis using finite element method (FEM)
- Permeability functions
- Influence of meshes on results; mesh selection and quality

### ■ **Module V: Continuum Modelling of Slopes**

- Application of FEM to slope stability analysis
- Advantages of FEM
- Gravity loading approach
- Strength reduction approach

### ■ **Module VI: Case Studies in Rock and Soils**