

**Two-Day Short Course on  
Block Theory & Applications for Surficial  
and Underground Rock Excavations**

will be taught by

**Professor P.H.S.W. Kulatilake**

Dept. of Materials Science & Engineering

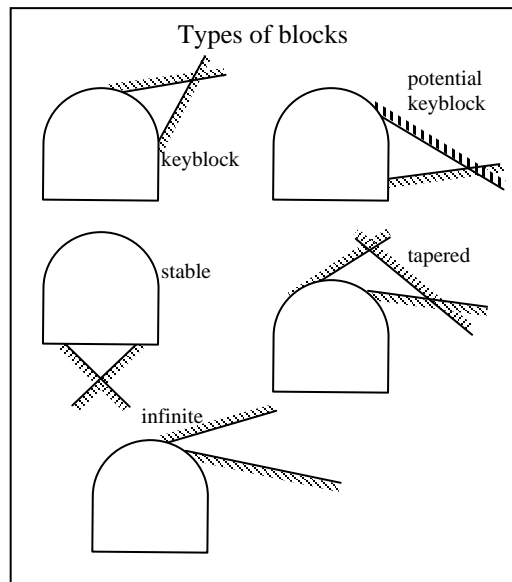
The University of Arizona

Tucson, Arizona, USA

Ph: 520-621-6064

Fax: 520-621-8059

E-mail: [kulatil@u.arizona.edu](mailto:kulatil@u.arizona.edu)



**March 19-20, 2010**

Course will be taught at

**Four Points by Sheraton  
Tucson University Plaza**

1900 East Speedway

Tucson, Arizona 85719

**Tel:** 520-327-7341

**Fax:** 520-327-0276

**Email:** [97506FrontDesk@fourpoints.com](mailto:97506FrontDesk@fourpoints.com)

<http://www.starwoodhotels.com/fourpoints/>

**OBJECTIVES**

The objective of the short course is to show the applications of block theory for rock mass surficial and underground excavations. The course lecture notes that is equivalent to about 250 pages will be produced on a CD and will be distributed at the start of the course. A few computer programs will be applied to joint data from Three Gorges dam site, China and a mine in Arizona to illustrate the applications.

**COURSE CONTENT**

**Part 1: Introduction to Rock Fracture Sets & Rock Block Instability; Stereographic Projection and Discontinuity Shear Strength (1/2 day)**

A power point presentation on rock fracture sets and rock block instability; Fracture geometry mapping & basic characterization; Principles of stereographic projection; Shear strength of rock discontinuities.

**Part 2: Block Theory & Applications for Surficial Excavations (3/4day)**

Stereographic projections for block theory; Stereographic projection of a joint pyramid; Projection of sliding direction; Types of blocks; Theorem for finiteness; Theorem on the removability of a finite, convex block; Symmetry of block types; Jointed blocks in 2D and 3D; Stereographic solution for jointed blocks; Conditions for removability of blocks intersecting surface excavations; Identification of key blocks in surficial excavations using stereographic projection; Procedures for designing rock slopes; Modes of sliding; Sliding force; Kinematic conditions for lifting and sliding; Stereographic projection for the joint pyramid corresponding to a given sliding direction; Comparison of

removability and mode analyses; Application of block theory for surficial excavations using discontinuity data from the Three Gorges dam site and a mine in Arizona to find maximum safe slope angles; Computer demonstration on applications of block theory for surficial excavations.

**Part 3: Block Theory & Applications for Underground Chambers (1/4 day)**

Key blocks in the roof, floor and walls; Blocks that are removable at edges; Blocks that are removable at corners; Applications for an underground chamber; Choice of direction for an underground chamber; Intersections of underground chambers; Pillars between underground chambers.

**Part 4: Block Theory & Applications for Tunnels & Shafts (1/2 day)**

Geometric properties of tunnels; Blocks with curved surfaces; tunnel axis theorem; types of blocks in tunnels; The maximum key block; Computation of the maximum key block using stereographic projection methods; Removable blocks of the portals of tunnels. Computer demonstration on applications of block theory for underground excavations.

**Who Should Attend:**

Civil, Mining and Geo-engineers and geologists who are involved in surface and underground excavations analysis, design and construction activities associated with jointed rock masses will benefit from the short-course.

**Time Schedule (each day):**

8:30—10:15 Lectures/computer demonstrations  
 10:15—10:30 Coffee break  
 10:30—12:15 Lectures  
 12:15-- 13:15 Lunch  
 13:15-- 15:00 Lectures  
 15:00-- 15:15 Coffee break  
 15:15-- 17:00 Lectures/computer demonstrations

**Narrative Biography of Prof. Kulatilake:**

Pinnaduwa H.S.W. Kulatilake, Ph.D., P.E., F.ASCE, is a Professor of Geological/Geotechnical Engineering at the University of Arizona. He has over 30 years of experience in rock mechanics, geotechnical engineering, and applications of probabilistic and numerical methods to geotechnical engineering. He has written over 150 papers and is a member of several technical committees. He has delivered 16 keynote lectures and 40 other invited lectures throughout the world on topics related to fracture network modeling, probabilistic geotechnics, mechanical properties of joints, rock slope stability and mechanical and hydraulic behaviour of rock masses. He is a research paper reviewer for 16 technical Journals and an editorial board member for Int. Jour. of Rock Mechanics & Mining Sciences and Int. Jour. of Geotechnical and Geological Engineering. He has taught short courses on stochastic fracture network modeling, rock slope stability analysis and Block theory in Sweden, Mexico, Austria, USA, Canada, Hong Kong, Poland, Finland, Australia, South Korea, Sri Lanka, Egypt, Iran and Chile. He served over 20 years either as the primary or the sole examiner for the geological engineering professional exam conducted by the Arizona State Board of Technical Registration. He was a Visiting

Professor at the Royal Institute of Technology and Lulea University of Technology in Sweden as part of his sabbatical leave. Also, he was a Visiting Research Fellow at the Norwegian Geotechnical Institute, for another part of his sabbatical leave. Due to the contributions that he made on teaching, research, consulting and service activities, he was elected to the Fellow Rank of the American Society of Civil Engineers at the relatively young age of 45. In 2002, he received Distinguished Alumnus Award from the College of Engineering, Ohio State University and Outstanding Asian American Faculty Award from the University of Arizona in recognition of his achievements and contributions made to the advancement of his profession. In December 2005, Eurasian National University, Kazakhstan conferred him "Honorary Professorship". In August 2007, he organized and ran a very successful International Conference on Soil & Rock Engineering in Sri Lanka. In January 2009, he organized and ran a successful, high quality International Conference on Rock Joints and Jointed Rock Masses in Tucson, Arizona.

**Registration Conditions:**

**The course fee of US\$ 750 must be paid in full by the registration deadline of February 15, 2010.** The course fee includes course notes, lunch and refreshments for morning and afternoon tea/coffee breaks. The number of applicants for each course is limited and acceptance will be on a first come, first served basis. If the course is cancelled, then the full short course fee will be refunded. No refund will be given after February 20, 2010. Non-arrivals at the course will be liable to pay the full course fee and no refund will be given. However, substitutions will be allowed.

**Registration Form**

**Short Course on Block Theory & Applications for Surficial and Underground Rock Excavations, Tucson 2010**

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

E-mail address: \_\_\_\_\_

Registration Fee: **US \$ 750**

I have read and agree to the conditions of entry as stipulated in this brochure.

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

**Method of Payment:**

**Option 1:** Approval to charge to a credit card. Send name on card, card number, expiry date (MM/YY) and card verification number (3 digit code on back of card or 4 digit code on front of card located above the credit card number) to fax number: US Code-520-529-7116. Please follow up with an e-mail to: [kulatila@u.arizona.edu](mailto:kulatila@u.arizona.edu) stating that you sent a fax (please do not send credit card information through e-mail).

**Option 2:** Make Cashier's check or money order payable in US funds, through a US bank to:

P.H.S.W. KULATILAKE and mail it to:

Prof. P.H.S.W. Kulatilake  
Dept. of Materials Science & Engineering  
Mines Bldg. # 12, Rm 131  
1235 E. James E. Rogers Way  
University of Arizona  
Tucson, AZ 85721, USA

**Option 3:** Wire transfer: Name of the bank, Routing number & the account number will be provided later upon receiving the completed Registration form.