2014 Annual Meeting Short Courses

(CEUs will be offered for each Short Course)

Short Course # 1

Recognizing Natural Hazards Using Aerial Images

Date: Tuesday, September 23, 2014
Time: 8:00 am–5:00 pm
Location: Doubletree Scottsdale
Fee: $260 Member, $290 Non-Member, $95 Student

About the Course
Failure to adequately recognize and characterize geomorphic, geologic, and hydrologic dangers on the ground using aerial photographs is one of the major factors contributing to damage to engineering works and subsequent loss of human life. There is simply no excuse for accepting loss; natural hazards are virtually always visible on aerial photographs. Individuals who complete this short course should be able to:

1. Recognize natural hazards by studying aerial photographs.
2. Analyze and interpret dangerous conditions properly.
3. Predict and characterize information pertaining to terrain, geology, vegetation, hydrology and land use patterns.

Instructor: Dr. Charles E. Glass
Dr. Glass is a registered professional geological engineer in the State of Arizona (#11330) specializing in earthquake engineering, active fault studies, scientific visualization of multiple data sets, and remote sensing. He has been the principal investigator or co-investigator on more than $4.3 M in grants and contracts at The University of Arizona. He has authored or co-authored 21 peer reviewed journal articles and four book chapters, has a U.S. patent for geotomography reconstruction, has published a book entitled "Interpreting Aerial Photographs to Identify Natural Hazards" (Elsevier, 2013), which will be part of the course materials, and has authored more than 50 other scientific and engineering works. Dr. Glass has been involved in analysis of remote sensing images and visualization of multiple data sets research and consulting for more than 35 years. His research has included image processing of digital images, numerical modeling of debris flows and lahars within a GIS framework, artificial neural network recognition of ground penetrating radar patterns, developing software for two-dimensional and three-dimensional reconstructions of ground penetrating radar profiles, post survey site modeling and virtual reality visualization, and aerial photo analysis for land-use, geologic hazards and resource assessments.

Course Outline
Early Morning Session (8:00am to 9:45am)
1. Introduction
2. Why Use Aerial Photographs?
3. Interpretation Process
4. Target Interactions
5. Colors and Patterns and Shapes

Break and Informal Discussions (9:45am to 10:15am)

Late Morning Session (10:15am to 12:00pm)
6. Reading Aerial Photographs
7. Texture Information
8. Color Information
9. Seeing the World in 3-D

Lunch Break (12:00pm to 1:00pm)

Early Afternoon Session (1:00pm to 2:45pm)
10. Recognizing Hazards on the Ground
11. Recognizing Hazards from Earthquakes and Faults

Break and Informal Discussions (2:45pm to 3:15pm)

Late Afternoon Session (3:15pm to 5:00pm)
12. Recognizing Landslide Hazards
    - Landslides in Soil
    - Landslides in Rock
2. Recognizing Flood Hazards
3. Recognizing Hazards from Subsidence Fissures
4. Recognizing Hazards from Collapsing Soil
5. Recognizing Hazards from Growth Faults
6. Call to Participants

Short Course # 2

Introduction to MODFLOW-USG

Date: Tuesday, September 23, 2014
Time: 8:00 am–5:00 pm
Location: Doubletree Scottsdale
Fee: $260 Member, $290 Non-Member, $95 Student

About the Course
The short course "Introduction to MODFLOW-USG (UnStructured Grids) is designed to provide the participants with a general introduction to the concepts, features, and functionality of the United States Geological Survey's groundwater flow model MODFLOW-USG. MODFLOW-USG uses finite-volume unstructured grids for model domain discretization in three-dimensions, representing a fundamental shift from the traditional rectangular finite-difference representation of MODFLOW. This represents a true breakthrough in groundwater modeling, allowing unprecedented flexibility of using any shape and size model cell to simulate a wide range of variations in flow system geometry and behavior. MODFLOW-USG also includes a framework for fully-coupled implementation of two- and one-dimensional discrete features (flow conduits) that allow for immediate application to complex water supply, and mining applications in fractured rock and karst environments.

The one-day course will introduce the participants to the general concepts used in MODFLOW-USG, fundamental differences between USG and previous versions of MODFLOW, and the basic use and functionality of unstructured grids in groundwater flow modeling. A variety of applications will be presented, and hands-on use of the MODFLOW-USG code will be illustrated in a group exercise. Participants should bring a laptop computer with the Windows XP or later operating version. Software will be provided for the hands-on exercise.

The course is appropriate for groundwater modelers, managers/decision makers, and anyone who interacts with models and is interested in keeping abreast of the latest modeling software and applications.

Instructor:
Jeffrey D. Weaver, Brown and Caldwell. Mr. Weaver completed his Masters of Science degree in Hydrology from the University of Arizona, and brings over 25 years of experience of detailed, state-of-the-art applications of numerical groundwater flow models to a wide range of environmental, mining, and water resource projects. He has provided technical leadership on numerous large-scale, complex, multi-stakeholder groundwater modeling applications throughout the United States and around the world. Mr. Weaver participated in early discussions and beta-testing of MODFLOW-USG prior to release, and has developed some of the first MODFLOW-USG applications in the consulting industry.

Short Course #3

LiDAR Scanning and Point Cloud Processing for Rock Characterization and Slope Stability

Date: Saturday, September 27, 2014
Time: 8:00 am–5:00 pm
Location: Doubletree Scottsdale
Fee: $260 Member, $290 Non-Member, $95 Student

About the Course
Ground-based LIDAR (also called 3D Laser Scanning and Terrestrial Laser Scanning) is being used for rock engineering applications and rock mechanics and geoscience research. In addition to open-pit and underground mining, an important application is characterizing and monitoring the geo-infrastructure, which includes highway slopes, dam and bridge foundations, tunnels and other underground excavations, and natural hazards that impact the built environment including landslides, earth fissures and debris flows. Applications include semi-automated rock mass characterization for surface slope stability and underground stability, monitoring of rock slopes and tunnels for displacements and rockfall occurrences, and detailed site characterization for engineering and monitoring.

This short course will provide detailed information and hands-on training on how to utilize ground-based LIDAR for the applications mentioned above. The focus of the training will be on "best practices" for the use of LIDAR in the field, and detailed training on the use of the Split FX semi-automated point cloud processing software for analyzing the LIDAR data. The first part of the short course (morning) will be an overview of rock mass characterization, stability, and monitoring using LIDAR, followed by a series of demonstrations and hands-on tutorials with the Split FX software. The second part of the short course (afternoon) will involve hands-on rock characterization and slope stability analysis of actual data from several field sites.

As part of the short course participants will receive a three-month license for the Split FX point cloud processing software. We will also demonstrate scanning and point cloud registration using the Faro Focus3D 330X LIDAR scanner and Faro Scene software. Participants in the short course should bring a laptop computer with enough free disk space for installing the Split FX software.

Instructor: John Kemeny, Professor, Dept. Mining and Geological Engineering. Dr. John Kemeny is Professor in the Department of Mining and Geological Engineering at the University of Arizona and is the Director of Research for Split Engineering. Dr. Kemeny has over 30 years of experience in rock mechanics and over 20 years experience with using new technologies such as digital image processing and LIDAR for rock engineering applications. Dr. Kemeny has published more than 30 papers and held more than 15 short courses on the use of LIDAR for rock mechanics and rock engineering applications. For the past eight years Dr.

Kemeny has been closely involved in the development and continual improvement of the Split FX point cloud software. At the University of Arizona, Dr. Kemeny teaches courses in rock mechanics, underground construction geomechanics and rock fracture mechanics.

Short Course # 4

Estimation of Soil Properties for Foundation Design

Date: Saturday, September 27, 2014
Time: 8:00 am–5:00 pm
Location: Doubletree Scottsdale
Fee: $295 Member, $325 Non-Member, $95 Student

The Subject and Course

Soil property estimation is fundamental to all of geotechnical design. On large projects with relatively generous budgets, all of the required field and laboratory tests can be conducted to evaluate the necessary geotechnical properties for design. For all other projects, testing will be more limited, and some properties will have to be estimated using correlations. Under the sponsorship of EPRI (Electric Power Research Institute) and other funding agencies, significant research has been conducted at Cornell to assess soil property correlations in a realistic manner, including the uncertainty in each correlation. However, the results of these efforts are not yet available in traditional types of reference sources such as texts and manuals. In this short course, much of this technology is presented within a consistent, coherent, and practical framework. The general topics covered include the following: soil property evaluation strategy, geologic inference in property assessment, comparative evaluation of in-situ tests, relative density assessment, in-situ stress evaluation, soil strength evaluation, and deformability estimation. This course is a much-expanded version of the well-known "Manual on Estimating Soil Properties for Foundation Design" by Kulhawy and Mayne. It has been given to many engineering and geologic professionals at sites around the world.

For this course, comprehensive notes are used that facilitate technology transfer. These include organized copies of the course presentation materials and a bibliography of supplemental readings to provide further details.

The Instructor

Dr. Fred H. Kulhawy, P.E., G.E., Distinguished Member ASCE, Consulting Geotechnical Engineer and Professor Emeritus, Cornell University, Ithaca, New York, USA. Dr. Kulhawy is an internationally-acclaimed educator, consultant, and researcher, who has received numerous prestigious awards for his work from ASCE, ADSC, CGS, IEEE, and others, including election to Distinguished Membership of ASCE, the ASCE Karl Terzaghi Award and Norman Medal, and the CGS Meyerhof Award. He is Professor Emeritus in Geotechnical Engineering and Geology at Cornell, and he has lectured widely, giving over 1480 presentations around the world. His teaching and research has focused on foundations, soil-rock-structure interaction, reliability, soil and rock behavior, and geotechnical computer applications. As a consultant, he has had extensive experience on six continents, with much of his experience dealing with foundation engineering and soil/rock property evaluation. In research, he has pioneered on many fronts, most notably with drilled foundations, reliability-based design, and property evaluation since the mid-1970s. His research and practice on these topics constitutes a majority of this course.

Course Objectives

- Learn about soil properties - from use of geologic inference, to proper modeling of field conditions, to assessing uncertainties in field testing, and much more.
- Learn about estimating soil properties, and their variability and uncertainty, from performance to index tests, in the field and in the laboratory.