



## 2010 SHORT COURSES

### **SHORT COURSE #1 – FEMA/HAZUS COURSE**

Tuesday, September 21 – 8:00 am to 6:00 pm

Off Site – GIS Laboratory, College of Charleston New Science Building - Meet in the Lobby of the Francis Marion \$260 (Includes Lunch, Mid-Morning, and Afternoon Breaks)

**Min. & Max Numbers: 8/20**

#### About the Course

HAZUS-MH is FEMA's GIS based hazard analysis and loss estimation tool. This course provides decision makers and management with an introduction to the capabilities that HAZUS-MH offers for helping communities understand the social and economic risks that they face from earthquake, flood, and hurricane hazards. They are led thru a combination of lectures and hands-on exercises that help them understand how HAZUS-MH can be used to define and analyze flood, earthquake, and hurricane wind hazards and the types of information that HAZUS-MH can produce about the social and economic losses that can result from each of those hazards. The course focuses on a level 1 analysis which makes it possible to perform a complete hazard analysis with minimal or no additional input of data beyond what is included with the software.

This course is recommended for anyone involved with or interested in planning for issues related to flood, earthquake, or hurricane wind events. This includes government officials, students and researchers, insurance companies, utilities and others.

**Prerequisites:** Participants in this course should have basic familiarity with ArcGIS concepts.

**Who Would Benefit?** Those involved in risk assessment activities, including Emergency Managers, GIS Specialists, Geologists, State and Local Planners, and Consultants, are prime candidates for receiving training in HAZUS.

#### **What Will be Learned?**

- All steps of the loss estimation process, from inventory verification and improvement to running a loss analysis.
- How to use HAZUS results for mitigation, as well as for readiness, response, and recovery activities.
- Useful GIS concepts

#### About the Instructors

**J. Clayton Wine** has over 13 years experience in local government at Charleston County. He received his undergraduate degree in English and was initially hired as a grants writer for the Building Services Department. As the years passed he began to expand into computer support with a focus upon damage assessment, natural hazards and GIS. Four years ago he was offered the opportunity to enter FEMA's HAZUS Vendor program, a rigorous training program to learn the specifics and technical backgrounds of HAZUS-MH and each of the three models (Hurricane, Flood and Earthquake). Mr. Wine is currently enrolled in the Masters of Environmental Sciences Program at the College of Charleston with a focus on natural hazards and is slated to graduate in December of this year. Mr. Wine strives to take highly technical processes and explain them in laymen terms, especially in his day to day meetings with elected and appointed officials.

**Charlie Kaufman** is an environmental scientist with professional experience in GIS, environmental sciences, and marine biology. Charlie graduated from the University of North Carolina at Wilmington with a B.S. in Marine Biology, and from the College of Charleston with a M.S. in Environmental Studies. He has worked on projects in both the public and private sectors involving coastal processes, natural hazards, stream and wetland delineations, endangered species habitat assessments, plant identification, GPS data collection and analysis, laser survey equipment, aquarium work, and laboratory research. Currently, Charlie is the GIS Manager for the College of Charleston as well as the Science Education and Outreach Coordinator for the SC Earthquake Education and Preparedness Program. Charlie is also a fully certified FEMA HAZUS-MH professional and trainer.

## SHORT COURSE #2 – INTRODUCTION TO GROUNDWATER CHEMISTRY

Tuesday, September 21 – 8:00 am to 6:00 pm

Calhoun Room at the Francis Marion Hotel

\$260 (Includes Lunch, Mid-Morning, and Afternoon Breaks)

**Min. & Max Numbers: 8/60**

### About the Course

This is an introductory geochemistry course for scientists and engineers working in the field of groundwater site characterization, contamination, and remediation. It is designed to provide basic information on geochemistry that is necessary to understand natural and contaminated systems and how the composition of groundwater evolves along its flowpath in the subsurface. Geochemical processes that will be described and discussed include solution complexation reactions, solution/gas interactions, mineral dissolution/precipitation, oxidation/reduction, and adsorption/desorption. Data collection, presentation, and interpretation of results will be discussed. Examples that illustrate the concepts are described throughout the class. At the end of this one-day class, attendees will have a better understanding of the types of geochemical processes that affect groundwater composition, the importance of collecting sufficient data to understand site-specific geochemical systems, and what the data they have collected mean from the standpoint of contaminant occurrence and mobility.

### **Agenda:**

8:00-9:15 The Aquifer Geochemical System

- Solution, Gas, and Solid Phases
- Chemical Reactions
- Definitions and Concentration Units
- Data Collection
- Solution Electrical Balance

9:30-10:45 Solution and Gas Phase Reactions

- Solution Speciation
- Henry's Law
- Partial Pressure
- Carbonate System
- pH

11:00-12:00 Mineral Dissolution/Precipitation

- Mineral Equilibrium
- Saturation Indices
- Computer Calculations

### **Noon Lunch**

1:00-2:00 Mineral Dissolution/Precipitation (cont.)

- Mineral Solubility
- System Factors affecting Solubility
- Reactive Minerals
- Data Collection (Solution and Solid Phases)

2:15-3:30 Oxidation/Reduction Reactions

- Redox Reactions
- Acid Mine Drainage
- Landfill Environment
- Redox Potential/Eh Measurements

3:45-6:00 Adsorption/Desorption Reactions and Modeling Methods

- Surface Complexation
- Kds and other Isotherms
- Retardation Factor
- Solid Phase Adsorption Characterization
- Modeling Geochemical Processes

### About the Instructor

**Bill Deutsch** holds a B.S. and M.S. in geological sciences from the University of Washington, Seattle. He has worked at Battelle/Pacific Northwest National Lab in applied research for 13 years and as a consultant for 17 years with Woodward-Clyde/URS, Jacobs Engineering, and as an independent contractor. His project experience includes environmental assessments and investigations of landfills, refineries, pesticides plants, military bases, mines and mills, federal weapons facilities and a wide variety of additional industrial sites. In addition, he has participated in remedial designs of sites contaminated with metals, radionuclides, pesticides, solvents, petroleum hydrocarbons and ordnance compounds. Since 1985, Bill has instructed more than 125 courses on groundwater geochemistry and geochemical modeling. He is the author of Groundwater Geochemistry, published by CRC Press, and is a principal scientist at Geochemistry Services LLC.

### **SHORT COURSE #3 – ROCK CORE DESCRIPTIONS FOR ENGINEERING & ENVIRONMENTAL PURPOSES**

(SPONSORED BY AEG SECTIONS: ALLEGHENY/OHIO AND NORTH CENTRAL)

Tuesday, September 21 – 8:00 am to 6:00 pm

Pinckney Room at the Francis Marion Hotel

\$260 (Includes Lunch and Mid-Morning and Afternoon Breaks)

**Min. & Max Numbers: 8/40**

#### **About the Course**

Rock descriptions form the fundamental data source for use in analysis and design on many engineering and environmental projects. This course will train participants in observing, describing, and interpreting the critical data needed for analysis and design of foundations, groundwater flow evaluation, tunnels, and rock slope stabilization. Presentations on the most common descriptions systems, rock coring technique and tools, digital recording of observations, and supplemental down-hole geophysical methods will be included. Description methods will focus on fundamental rock and discontinuity features using methods that the participant can apply with any of the large number of description systems used by a consulting companies, owners, or government agencies. A wide range of rock core will be available for hands-on practice by participants.

#### **About the Instructors**

**Gary Rogers, PG**, Senior Associate Geologist and the Geosciences Service Area Leader with Schnabel Engineering. Mr. Rogers is a Professional Geologist with over 25 years of hands-on experience in engineering geology and hydrogeology related to dams, foundations, landfills, nuclear waste sites, power plants, slope stability investigations, and subsurface exploration programs. In his work on these projects he has used many of the rock description methods required by various owners and agencies. He completed a B.S. at Kent State University where he focused on hydrogeology and field studies and an M.S. at the University of Wisconsin-Madison with a thesis project in structural geology. He has worked for large engineering firms (Ebasco Services, Inc.), was a founder of an environmental and engineering firm (Applied Geosciences and Engineering), and is now with a mid-size employee-owned firm (Schnabel Engineering). He is past Chair of the Carolinas Section of AEG and is active on both section and national committees of AEG.

**Brad Worley, PG**, Geologist with North Carolina Department of Transportation. Mr. Worley graduated from UNC Wilmington in 1995 with a BS in Geology and in 2000 with a MS in Geology. Academically, he is a grass-roots geologist, mapping in metamorphic terranes. Brad has worked for the NCDOT Geotechnical Engineering Unit since finishing graduate school. He worked in the Raleigh Geotechnical Field Office as a field geologist for three years before moving to the Unit's headquarters where he works as a project geologist in the Contracts/Investigation Section. He coordinates geotechnical investigations through limited service contracts and reviews geotechnical reports. Brad has participated in the AEG Carolinas Section's Visiting Professional program for the past three years. In September, 2009, he participated in AGI's Congressional Visits Day, in Washington, DC, as one of three

representatives from AEG. Brad is a licensed professional geologist in North Carolina.

**Brian Banks, PG**, is a Senior Associate and the Geoscience Team Leader for Schnabel Engineering's Gaithersburg, Maryland office. He has 13 years of experience as an engineering geologist, providing technical expertise and project management for a wide variety of geo-engineering projects including deep and shallow foundations in soil and rock, slope stability, rockfall hazards, groundwater hydrology, rock excavation, deep fill, mine hazards, construction administration, dam foundations, subsurface contamination, and feasibility assessments for site development. Mr. Banks is an expert in developing and directing subsurface exploration programs for large projects such as power plants and transportation facilities. He employs a wide range of investigative techniques including rotary drilling and rock coring, in situ testing, geophysics, direct observation, geologic mapping, remote sensing, groundwater monitoring, and laboratory testing to identify and characterize subsurface materials for design and construction of civil engineering works.

**Scott L. Deaton** is President of Dataforensics, LLC, a privately held software company that specializes in helping civil engineering companies use technology to improve and streamline their data collection, management and reporting. He obtained his B.S. in Civil Engineering from Purdue University in 1997. After working briefly in consulting, he returned to school at the Georgia Institute of Technology where he received his M.S. and Ph.D. degrees in Civil Engineering in 1999 and 2002 respectively. Since founding Dataforensics in 2002, he has led Dataforensics to deploy enterprise digital data collection and management systems that are now being utilized by more than 12 USACE districts and more than 300 clients in 14 countries.

**Mike Neal**, is the Eastern coring operations manager for Boart Longyear Company. He has 29 years of experience in the drilling industry, 26 of which with Boart Longyear. He is experienced in surface and underground diamond core drilling, tooling, equipment, operations and procedures.

**John R. Stowell** has been President of Mount Sopris Instrument Company, a manufacturer of borehole logging systems and software, since 1985. Prior to that, John served as deputy director of the Colorado Oil and Gas Commission, and as an engineering consultant. From 1970 until 1981, John was an engineer and manager with Schlumberger. John received a degree in Physics from the University of Colorado at Boulder in 1970, and is a registered professional engineer. He is a member of SEG, EAGE (NSD), SPE, EEGS, and SPWLA. John is currently president of EEGS, the Environmental and Engineering Geophysical Society.

## **SHORT COURSE #4 – USE OF GEOPHYSICAL EQUIPMENT**

Saturday, September 25 – 8:00 am to 6:00 pm

Calhoun Room at the Francis Marion Hotel

\$260 (Includes Lunch and Mid-Morning and Afternoon Breaks)

**Min. & Max Numbers: 8/60**

### **About the Course**

The purpose of this AEG Short Course is to introduce the more common near-surface geophysical techniques and present representative applications and case histories. Over the past two decades, advances in geophysical equipment and software technology have allowed more rapid and detailed data acquisition, thus reducing the relative cost of surveys while increasing the sophistication and usefulness of the results. Practical applications for geophysics exist in a wide variety of fields, including power, transportation, dams and reservoirs, mining, solid waste, hazardous waste, and many others.

### **The following is a list of the geophysical methods that will be presented in the short course:**

- Magnetometry
- Electromagnetic Induction (Frequency and Time Domain)
- Electrical Resistivity Imaging and Induced Potential (IP)
- Seismic Refraction
- Seismic Reflection
- Surface Wave Seismic (MASW, SASW, ReMi)
- Ground-Penetrating Radar (GPR)
- Gravity
- Borehole Geophysics (overview)

A brief discussion of basic geophysical concepts will be used to introduce the various geophysical properties that are measured and the geophysical methods that are used to provide these measurements. Example applications will be presented for each method. Some more detailed case histories involving one or more methods will also be presented, including Ron Kaufmann making a presentation covering the use of gravity surveys.

There will be onsite “demonstration” of some of the above methods using commercially available geophysical systems.

The goal of this short course is that each participant will walk away with a basic understanding of the various geophysical methods available to the professional and their potential application to help solve engineering, environmental, and geologic questions.

### **About the Instructors**

**Ronald Crowson**, President of Geo Solutions Limited, Inc. Ron Crowson is a native of eastern North Carolina. He currently owns and manages Geo Solutions Limited, Inc., a small geophysical and geological firm located in Raleigh, North Carolina. He has attended East Carolina University, the University of South Carolina, Free Berlin University, Long Beach State, The University of Texas (Austin), and North Carolina State University. He spent the first years of his career (circa 1970s) working with phosphate mining companies (Agrico, IMC) as an exploration geologist and mine development specialist. He also has worked on coastal research programs, as well as other coastal initiatives. As a geophysicist, he was a program director with Geophex, and an office manager with O’Brien & Gere Engineers in Raleigh, NC. In 2000, he formed his own geophysical firm (Geo Solutions Ltd.) and has since combined consulting work with volunteer as the State of North Carolina’s forensic geophysicist.

**Ron Kaufmann** of Spotlight Geophysical Services, LLC in Miami, Florida, has over 15 years of geophysical consulting experience, including positions of Vice President and Senior Geophysicist at Technos, Inc. and post-graduate experience at Oak Ridge National Laboratory. He holds an M.S. degree in Geophysics from Georgia Institute of Technology. He has led geophysical investigations of the Panama Canal expansion, nuclear power plants, Superfund sites, and other high-profile projects within the United States and abroad. Mr. Kaufmann is an expert in the use of microgravity for karst investigations and has been instrumental in the development of geophysical methods in shallow marine environments. He is author and co-author of over twenty professional papers that focus on the application of geophysical techniques and has served as an instructor for geophysical short courses.

**Jeremy S. Strohmeyer** received a BS degree in Geology and Geophysics from the University of Missouri-Rolla in 2000, and an MS degree in Applied Geophysics from the University of Missouri-Rolla in 2001. He is a licensed geologist in North Carolina, and serves as a Project Geophysicist for Schnabel Engineering in Greensboro, specializing in the application of geophysics to environmental and engineering projects. He is highly skilled in data acquisition and analysis using various near-surface and borehole geophysical methods.

**SHORT COURSE #5 – INTERMEDIATE GROUNDWATER GEOCHEMISTRY  
(SPONSORED BY REGENESIS)**

Saturday, September 25 – 8:00 am to 6:00 pm

Pinckney Room at the Francis Marion Hotel

\$260 (Includes Lunch and Mid-Morning and Afternoon Breaks)

**Min. & Max Numbers: 8/40**

**About the Course**

This is an intermediate geochemistry course for scientists and engineers working in the field of groundwater site characterization, contamination, and remediation. It is designed to show the importance of geochemistry in the evaluation of contaminant fate and transport and in the design of applied remediation methods. Although a brief introduction to geochemical processes will be provided, this is an applied geochemistry class and assumes attendees have a basic knowledge of groundwater chemistry (mineral equilibrium, redox processes, and adsorption/desorption effects). Geochemical models based on public-domain computer codes will be used to predict the impact of natural attenuation processes and applied remediation methods on aquifer remediation. Examples that illustrate the concepts are described throughout the class. These examples include cases where a lack of geochemical knowledge about site conditions can lead to underestimations of the degree of required active remediation or exacerbation of contamination in an aquifer. At the end of this one-day class, attendees will have an appreciation for the importance of geochemistry in predicting inorganic/organic contaminant fate and transport and the application of geochemistry to in situ active remediation methods.

**Agenda:**

8:00-9:15 Aquifer Geochemical Processes

- Natural Geochemical System
- Solution and Gas Phase Processes
- Mineral Dissolution Precipitation
- Redox Processes
- Adsorption/Desorption Effects

9:30-10:45 Fate and Transport of Inorganic Contaminants

- Contaminated Geochemical System
- Adsorption/Desorption Effects
- Mineral Precipitation/Dissolution Effects
- Limitations on Natural Attenuation
- Conservative Contaminants

11:00-12:00 Fate and Transport of Organic Contaminants

- Contaminated Geochemical System
- Volatilization
- Dissolution
- Adsorption/Desorption
- Degradation
- Conservative Contaminants

Noon-1:00 Lunch

1:00-2:15 Natural Attenuation Processes and Modeling

- Initial Site Conditions
- Mineral Equilibrium Control on Groundwater Concentration (Lead example)

- Adsorption/Desorption Control on Groundwater Concentration (Arsenic example)
  - Computer Codes for Geochemical Modeling
- 2:30-3:45 Applied Remediation Methods
- Neutralization
  - Mineralization
  - Oxidation/Reduction Adjustment
  - Adsorption/Desorption Enhancement
- 4:00-6:00 Applied Remediation Modeling
- Landfill Leachate Oxidation/Degassing/Mineral Precipitation
  - Enhanced Arsenic Adsorption
  - pH Neutralization and Lead (Pb) Mineral Precipitation and Adsorption

**About the Instructor**

**Bill Deutsch** holds a B.S. and M.S. in geological sciences from the University of Washington, Seattle. He has worked at Battelle/Pacific Northwest National Lab in applied research for 13 years and as a consultant for 17 years with Woodward-Clyde/URS, Jacobs Engineering, and as an independent contractor. His project experience includes environmental assessments and investigations of landfills, refineries, pesticides plants, military bases, mines and mills, federal weapons facilities and a wide variety of additional industrial sites. In addition, he has participated in remedial designs of sites contaminated with metals, radionuclides, pesticides, solvents, petroleum hydrocarbons and ordnance compounds. Since 1985, Bill has instructed more than 125 courses on groundwater geochemistry and geochemical modeling. He is the author of Groundwater Geochemistry, published by CRC Press, and is a principal scientist at Geochemistry Services LLC.

## **SHORT COURSE #6 – PRACTICAL ROCK SLOPE ENGINEERING**

Saturday, September 25 – 8:00 am to 6:00 pm

Laurens Room at the Francis Marion Hotel

\$260 (Includes Lunch and Mid-Morning and Afternoon Breaks)

**Min. & Max Numbers: 11/25**

### **About the Course**

This one-day short course will examine basic rock slope stability presented from the standpoint of geologists and engineers responsible for evaluating the safety and stability of both natural and manmade rock slopes, including highway cuts, mines, quarries, and building excavations. Participants will receive a CD-ROM of reference materials plus software, including the Colorado Rockfall Simulation Program (CRSP) and ROCKPACK III for evaluating rockslide potential.

### **Topics**

- Rock slope field data collection methods and drilling and sampling techniques
- Rock mass rating systems
- Estimation of discontinuity and rock mass shear strength
- Kinematic slope stability analysis via stereonet projection
- Two and three dimensional limit equilibrium block stability analysis
- Two dimensional force and moment equilibrium rock mass analysis
- Rockfall modeling
- Rockfall hazard rating systems
- Slope remediation strategies including:
  - Slope reconfiguration
  - Drainage
  - Block reinforcement
  - Mesh
  - Buttresses
  - Case histories involving highway reconstruction, and
  - Blasting techniques if time allows

Basic stability theory will be covered during the course with a focus on practical aspects of rock slope evaluation, design, and remediation.

### **About the Instructors**

**Dr. Martin Woodard** is a Consulting Engineering Geologist living in Radford, Virginia. He received a BA in geology from Potsdam State University, an MS in engineering geology from Radford University, and PhD in engineering geology at Kent State University in May 2004. He held the position of Assistant Professor at Radford University for two years where he taught courses including engineering geology and rock mechanics. In 2000, he was awarded AEG's Marliave Scholarship award and in 2002 the AEG Platinum Corporate Sponsor Award, given to the outstanding student abstract for work on his dissertation entitled "Development of a Rockfall Hazard Rating Matrix for the State of Ohio." Marty has been a consulting engineering geologist involved with a variety of rock slope engineering projects throughout the country including Ohio, Pennsylvania, Virginia, West Virginia, California, Colorado, Hawaii and South America.

**Dr. Chester F. Watts (Skip)** received his Bachelors Degree in geology from Virginia Tech in 1974, a Masters Degree in physical science from Radford University in 1976, and a Doctorate in engineering geology from Purdue University in 1983. He currently holds the title of Dalton Distinguished Professor of Geology at Radford University where he has taught for 20 years and serves as Director of Radford's Institute for Engineering Geosciences. Watts is a Certified Professional Geologist in the Commonwealth of Virginia and the author of ROCKPACK computer software, used internationally for analyzing the safety and stability of highways, mines, quarries, buildings, bridge foundations, and mountain slopes. He serves as a rock slope stability consultant to numerous federal agencies, highway departments, and engineering firms throughout North America.

**Dr. William Gates (Bill)** is Principal Geological Engineer and Senior Consultant with Kleinfelder's Technical Resource Center. He received a BS in geology from Campbell College, an MS in geological engineering from the South Dakota School of Mines, and a Ph.D. in geological engineering from the University of Nevada at Reno. He is registered as an Engineering Geologist, Hydrogeologist, and Professional Engineer in several of the western states. Bill has been practicing engineering geology for over 35 years and has been involved with numerous rock slope engineering projects throughout the country including the states of California, Washington, New Mexico, Idaho, Utah, and Nevada, and Mexico.

**Dr. Brendan Fisher** is a Principal at Fisher & Strickler Rock Engineering, LLC. He received a BA in geology from Potsdam University, an MS in engineering geology from Radford University, and an MS in geotechnical engineering from Virginia Polytechnic University. Brendan recently completed his PhD in rock mechanics at the University of British Columbia. He is registered as a Professional Geologist or Professional Engineer in various states throughout the United States. Brendan has been involved with numerous rock slope investigation and designs throughout North and South America.