THE UNIVERSITY OF ARIZONA
School of Mining & Mineral Resources

SLOPE PERFORMANCE MONITORING

PROFESSIONAL DEVELOPMENT COURSE

COURSE BEGINS SEPTEMBER 12TH

Offered by the Geotechnical Center of Excellence (GCE) at the University of Arizona, with course content developed and presented by leading industry experts.

REGISTER NOW!

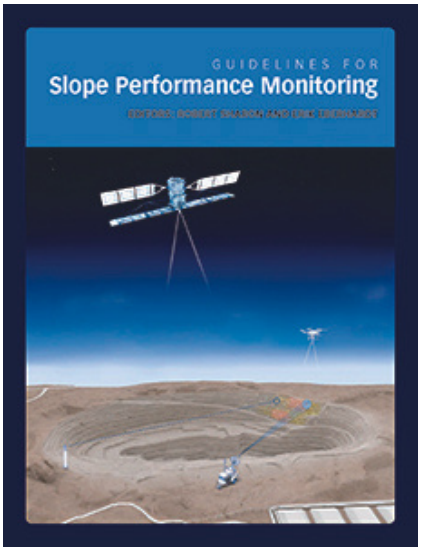
COURSE FEE: $899*

LIVE & ONLINE, this 14-week course starts **September 12th, 2023.** The course includes approximately 21 hours of pre-recorded content and live, virtual Q&A sessions, where students can engage directly with subject matter experts

*Discounts available for GCE Members, current students, and groups of 6+

LOP Large Open Pit Project
OPEN PIT OF THE FUTURE

This course is developed and facilitated by the Geotechnical Center of Excellence and under-written by the Large Open Pit (LOP) Project. Course content is based on the LOP Guidelines for Slope Performance Monitoring text, and developed in collaboration with the editors, Robert Sharon and Erik Eberhardt.



WHO SHOULD ATTEND?

Engineers, geologists, and other mining professionals working with monitoring equipment or interested in doing so in the future.

Geotechnical consultants who interpret monitoring data or integrate data into engineering analysis.

Anyone looking to strengthen their understanding of slope monitoring!

TOPICS COVERED

Movement detection • Displacement monitoring • Subsurface deformation monitoring • Water monitoring • Geophysical monitoring • System design, support, and operations • Data acquisition and management • Data analysis, utilization, and communication • Slope monitoring case studies

SCAN THE QR OR CLICK HERE TO REGISTER TODAY!

Questions? Contact the Geotechnical Center of Excellence: gce@arizona.edu

Or visit minerals.arizona.edu/innovation/geotechnical-center-excellence

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RELEASE 1 SEPT 12	**MODULE 1: OVERVIEW OF SLOPE MONITORING**
	SECTION 1 INTRODUCTION / WHY WE MONITOR PIT SLOPES • INTRODUCTION TO SLOPE PERFORMANCE MONITORING • POTENTIAL FAILURE MODES • TIME DEPENDENT BEHAVIOR OF ROCK SLOPES • HISTORY OF PIT SLOPE MONITORING • CURRENT STATUS OF SLOPE MONITORING • CASE STUDY: FREEPORT MCMORAN - INTEGRATED MONITORING PROGRAM
RELEASE 2 SEPT 26	**MODULE 2: MOVEMENT DETECTION**
	INVESTIGATIVE, PREDICTIVE AND OBSERVATIONAL MONITORING • CRACKMETERS • WIRELINE EXTENSOMETERS • PRECISE LEVELLING • LASER DISTANCE MEASURING • TILTMETERS • CASE STUDY: POINT MEASUREMENTS - DEBSWANA
	MODULE 3: DISPLACEMENT MONITORING. POINT MEASUREMENTS
	MANUAL AND ROBOTIC TOTAL STATIONS • GPS AND GNSS • APPLICATION: POINT MEASUREMENT
RELEASE 3 OCT 10	**MODULE 4: DISPLACEMENT MONITORING. FULL-SPATIAL MEASUREMENTS**
	GROUND-BASED RADAR (SAR AND RAR) • GROUND-BASED LASER SCANNERS (LIDAR) • DIGITAL PHOTOGRAMMETRY • DRONE PHOTOGRAMMETRY FOR DEFORMATION AND DISPLACEMENT MONITORING • APPLICATION: UTILIZING TERRESTRIAL LASER SCANNERS (TLS) FOR SLOPE PERFORMANCE MONITORING • CASE STUDY: GROUND-BASED RADAR FOR SLOPE MONITORING
	MODULE 5: DISPLACEMENT MONITORING. SITE-WIDE MEASUREMENTS
	CREWED AND UNCREWED AERIAL VEHICLES • SATELLITE RADAR • INSAR AS AN APPLICATION OF SAR • INSAR IN THE CONTEXT OF MINING • CASE STUDY: BACK ANALYSIS OF AN UNEXPECTED SLOPE FAILURE IN AN OPEN-PIT MINE • CASE STUDY: INSAR - JAGERSFONTEIN
RELEASE 4 OCT 24	**MODULE 6: SUBSURFACE DEFORMATION MONITORING**
	TIME DOMAIN REFLECTOMETRY • INCLINOMETERS • SHAPE ARRAY ACCELEROMETERS • SMART MARKERS
	MODULE 7: WATER MONITORING AND MANAGEMENT
	METEOROLOGICAL MONITORING AND SURFACE MONITORING • GROUNDWATER MONITORING • HYDROLOGICAL MONITORING OF WASTE DUMPS • HYDROLOGICAL MONITORING DURING OPEN-PIT CLOSURE • CASE STUDY: WATER MONITORING AND MANAGEMENT - HIGHLAND VALLEY COPPER
RELEASE 5 NOV 7	**MODULE 8: GEOPHYSICAL MONITORING**
	MICROSEISMIC MONITORING • CASE STUDY: MICROSEISMIC - SUNRISE DAM GOLD MINE • BLAST PERFORMANCE MONITORING
	MODULE 9: MONITORING AND SYSTEM DESIGN CONSIDERATIONS
	SYSTEM DESIGN CONSIDERATIONS • RISK-BASED SLOPE MONITORING CONSIDERATIONS • STRATEGIC VS. TACTICAL MONITORING • INTEGRATED SLOPE MONITORING • CAPABILITIES AND LIMITATIONS OF SLOPE MOVEMENT MONITORING SYSTEMS
RELEASE 6 NOV 21	**MODULE 10: SYSTEM SUPPORT AND OPERATION. PRACTICAL ASPECTS**
	MINE OPERATIONAL CONSIDERATIONS • EQUIPMENT PROTECTION AND RELIABILITY • PROGRAM STAFFING AND ORGANIZATION • COMMUNICATIONS • CASE STUDY: THE LEO SLIDE - RIO TINTO • CASE STUDY: SLOPE MONITORING SYSTEM OPERATION - NEVADA GOLD MINES • CASE STUDY: RAPID AND SMALL-SCALE SLOPE FAILURES
	MODULE 11. DATA ACQUISITION, TRANSMITTAL, VALIDATION AND MANAGEMENT
	DATA COMMUNICATIONS • DATA MANAGEMENT AND HANDLING • DATA VALIDATION AND RELIABILITY • CASE STUDY: DATA MANAGEMENT AND COMMUNICATION - VENETIA MINE • CASE STUDY: DATA MANAGEMENT AND COMMUNICATION - PLANAR FAILURE IN AUSTRALIA
RELEASE 7 DEC 5	**MODULE 12. DATA ANALYSIS AND UTILIZATION**
	DATA VISUALIZATION • INTEGRATED MONITORING • TREND ANALYSIS • UTILIZATION OF MONITORING DATA • COMBINING MONITORING DATA WITH NUMERICAL MODELING • CASE STUDY: COMBINING MONITORING DATA WITH NUMERICAL MODELING • CASE STUDY: DATA ANALYSIS AND UTILIZATION
	MODULE 13. DATA UTILIZATION AND COMMUNICATIONS
	MINE PLAN STABILITY EVALUATION • OBSERVATIONAL MINING • ALARMING INSTABILITIES AND FAILURES • PRACTICAL ASPECTS OF ALARM MANAGEMENT AND RESPONSE • REPORTING PROCESS AND DUTY OF CARE