OSMRE TRAINING

Career Series Guide

Introduction to the OSMRE Training Career Series Guide

The Career Series Guide is designed to provide a training roadmap for Surface Mining Control and Reclamation Act of 1977 (SMCRA) related employees. It provides insights into the different career paths under the SMCRA umbrella, as well as the recommended professional development opportunities offered by OSMRE, for each career series. This tool is ideal for supervisors creating a training plan for their employees, or for employees who want to expand their understanding of OSMRE's training opportunities.

How do I use the Career Series Guide?

The Career Series Guide, coupled with the NTTP and TIPS Course Description Catalog, will assist supervisors, managers, and employees, in navigating their professional development journey.

You can review each career series and get a brief description of the general responsibilities along with the recommended courses that best support the development of expected tasks through entry-level and advanced coursework. This allows supervisors and managers to meet the training needs of employees with all levels of experience.

The last tool this adds to your toolbox is the Career Series Matrices. The matrices provide a graphic display of courses matched with the different career series. This helps to capture which courses may suit several career series at once and identify the very specialized courses needed for your most experienced employees.

Learning Phases

Phase 1 Learning

Phase 1 Learning is a list of entry-level courses that should be priority training for employees beginning their SMCRA careers. In the Course Matrices at the end of this document, Phase 1 Learning is marked with a 1 in the boxes.

Phase 2 Learning

Phase 2 Learning is a list of advanced training that more experienced employees should prioritize as they begin to specialize in their SMCRA careers. In the course Matrices at the end of this document, Phase 2 Learning is marked with a 2 in the boxes.

Phase 3 Learning

Phase 3 Learning is open learning opportunities for employees to expand their SMCRA knowledge base. There is no annotation for Phase 3 Learning in the Career Series Matrices. Any course that does not fall into Phase 1 or 2 Learning can be considered Phase 3 Learning.

Engineer Career Series

Regulatory Engineers (RE)

Regulatory engineers are employed in a variety of regulatory capacities within coal mining. Their duties may include any or all the following:

- Evaluation of mine site permit plans and designs for compliance with regulatory provisions of SMCRA and state regulations
- Evaluation of field conditions related to mine plans and engineering designs
- Evaluation of regulatory engineering field problems and construction evaluations
- Evaluation of field conditions relative to potential mining-related causes
- Serves as an expert in the application of geotechnical and mining engineering principles to issues involving mining and land reclamation

Phase 1 Learning
• Acid-Forming Materials • AMD Treat: Mine Drainage Treatment Cost Calculations • Blasting and Inspection • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • Bonding: Cost Estimation • CADD - AutoCAD Essentials • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • Erosion and Sediment Control • ESRI - Arc Hydro: GIS for Water Resources • ESRI - ArcGIS Online: Essential Workflow • ESRI - Creating Story Maps with ArcGIS • ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS • ESRI - Migrating from ArcMap to ArcGIS Pro • ESRI - Sharing Content to ArcGIS Enterprise

Phase 2 Learning
• Enforcement Procedures • Expert Witness • Historic Archeological Resources • NEPA Procedures • Passive Treatment • Quantitative Hydrogeology • SMCRA and the ESA • Wetlands Awareness • ArcGIS Spatial Analyst: For Mining and Reclamation • CADD - AutoCAD II Beyond the Basics • ESRI - ArcGIS Pro: Essential Workflows • ESRI - Creating and Editing Data with ArcGIS Pro • ESRI - Spatial Analysis with ArcGIS Pro • ESRI - Imagery Analysis in ArcGIS Pro • ESRI - Working with Parcel Data in ArcGIS Pro • ESRI - Creating Python Scripts for ArcGIS Pro • ESRI - Managing Geospatial Data with ArcGIS Pro

- Evidence Preparation and Testimony
- Galena Slope Stability Analysis – Distance Learning
- Introduction to Earth Vision 2D and 3D Modeling
- Introduction to GIS for Mining and Reclamation I – Distance Learning
- Introduction to SMCRA Inspections
- Permit Findings
- Soils and Revegetation
- Surface and Groundwater Hydrology

Underground Mining Technology

Abandoned Mine Land Engineers (AE)

Abandoned Mine Land (AML) engineers and designers include people who are employed in a variety of capacities within the AML programs and are involved with the development of design documents and specifications related to:

- AML construction planning and project development where they may be involved in the creation of designs and specifications for AML reclamation projects
- Evaluation of consultant-developed designs for construction projects
- Evaluation and analysis of field-related construction problems and projections
- Analysis of abandoned mine land citizen complaints related to land stability
- Subsidence and other engineering-related problems
- Generally, serves as an expert in the application of geotechnical and mining engineering principles to issues involving mining and land reclamation

Phase 1 Learning
• Acid-Forming Materials • AMD TREAT: Mine Drainage Treatment Cost Calculations • AML Dangerous Highwalls • AML Dangerous Openings • AML Drilling and Grouting • AML Fires • AML Landslides • AML Reclamation Projects • AML Subsidence • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • Bonding: Cost Estimation • CADD - AutoCAD Essentials • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • Erosion and Sediment Control • ESRI - Arc Hydro: GIS for Water Resources • ESRI - ArcGIS Online: Essential Workflow • ESRI - Creating Story Maps with ArcGIS • ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS

Phase 2 Learning
• AML Realty • Coalfield Communications • Expert Witness • NEPA Fundamentals • Passive Treatment • SMCRA and ESA • ArcGIS Spatial Analyst: For Mining and Reclamation • CADD - AutoCAD II Beyond the Basics • ESRI - ArcGIS Pro: Essential Workflows • ESRI - Creating and Editing Data with ArcGIS Pro • ESRI - Spatial Analysis with ArcGIS Pro • ESRI - Imagery Analysis in ArcGIS Pro • ESRI - Working with Parcel Data in ArcGIS Pro • ESRI - Creating Python Scripts for ArcGIS Pro • ESRI - Managing Geospatial Data with ArcGIS Pro

- ESRI - Migrating from ArcMap to ArcGIS Pro
- ESRI - Sharing Content to ArcGIS Enterprise
- Evidence Preparation and Testimony
- Galena Slope Stability Analysis – Distance Learning
- Introduction to Earth Vision 2D and 3D Modeling
- Introduction to GIS for Mining and Reclamation I – Distance Learning
- Introduction to SMCRA Inspections
- Permit Findings
- Soils and Revegetation
- Surface and Groundwater Hydrology

Underground Mining Technology

Explosive Engineers (EE)

Explosive engineers work in active and/or abandoned mine programs, including individuals who work with active mining regulation and are responsible for:

- blasting plan review in applications for mining permits
- compliance evaluations with blasting standards
- analysis of blasting-related complaints

In the AML program, individuals may be involved in:

- Excavation activities
- Backfilling
- Void caving projects
- Development of contract specifications

Phase 1 Learning
• Applied Engineering • Basic Inspection Workbook • Blasting and Inspection • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • CADD - AutoCAD Essentials • Effective Writing • Enforcement Procedures • Evidence Preparation and Testimony • Historical Archeological Resources Introduction to SMCRA Inspections

Phase 2 Learning
• Advanced Blasting • Coalfield Communications • Enforcement Procedures • Excess Spoil and Disposal • Expert Witness • Subsidence • Underground Mining Technology CADD - AutoCAD II Beyond the Basics

Inspection Career Series

Regulatory Inspector/Enforcement Staff (ES)

Regulatory inspector's main jobs may fall in any of the following areas:

- Field inspection of macro-regulated mine sites
  - Active mining
  - Sites in any of the multiple phases of reclamation
- Documentation of activities
- Compliance evaluation and the issuance and defense of regulatory enforcement actions
- Field inspections of citizen complaints related to the mining and reclamation processes
  - Includes those whose inspection responsibilities might be more specialized to revegetation success
- Bonding Release evaluations
- Contemporaneous reclamation compliance reviews

Phase 1 Learning

- Acid-Forming Materials: Fundamentals and Applications
- Applied Engineering
- Basic Inspection Workbook
- Blasting and Inspection
- Blasting Log Evaluation Program (BLEP) – Distance Learning
- BlueMarble - Raster & Terrain Analysis in Global Mapper
- BlueMarble - Introduction to Global Mapper
- BlueMarble - Lidar & Point Cloud Processing in Global Mapper
- BlueMarble - Working with LiDAR ArcGIS
- CAD 100: AutoCAD Essentials – Distance Learning
- CAD 101: AutoCAD for Permitting and Reclamation
- CAD 400: Bridging the CAD and GIS Gap in the SMCRA Window
- CADD - AutoCAD Essentials
- CADD - AutoCAD II Beyond the Basics
- CADD AutoCAD Map 3D & AutoCAD Raster
- Effective Writing
- Enforcement Procedures

Phase 2 Learning

- Advanced Blasting
- Coalfield Communications
- Subsidence
- CAD 200: AutoCAD Map 3D for Permitting and Reclamation
- CAD 201: Carlson Mining Site Design – Permitting and Reclamation
- CAD 301: Carlson Mining, Field, Hydrology, and Natural Regrade for Permitting and Reclamation
- CADD - AutoCAD II Beyond the Basics

- Erosion and Sediment Control
- ESRI - Creating Story Maps with ArcGIS
- ESRI – Field Data Collection and Management with ArcGIS
- Evidence Preparation and Testimony
- Introduction to GIS for Mining and Reclamation I
- Introduction to GIS for Mining and Reclamation I – Distance Learning
- Introduction to SMCRA Inspections
- Modeling and Analysis with Groundwater Vistas
- Permit Findings
- SDPS: Surface Deformation Prediction System – Distance Learning
- SEDCAD Applications and Extensions for Mining and Reclamation
- Soils and Revegetation
- Surface and Groundwater Hydrology
- Testing and Analysis of Aquifer Characteristics with AQTESOLV

Underground Mining Technology

AML Inspector/Project Officer (AI)

The AML Inspection/Project Officer's main job duties fall into the areas of:

- Field inspection of AML sites for documentation of field conditions
- Evaluation of causes of field-related problems
- Development of remediation plans
- Field inspections of citizen complaints related to AML conditions
- Inspection responsibilities may be more specialized, such as a contract field inspection

Phase 2 Learning
• Acid Forming Materials: Basic Principles and Concepts • AMD TREAT: Mine Drainage Treatment Cost Calculations • AML Reclamation Projects • Applied Engineering • Basic Inspection Workbook • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • BlueMarble - Working with LiDAR ArcGIS • CAD 100: AutoCAD Essentials – Distance Learning • CAD 101: AutoCAD for Permitting and Reclamation • CAD 400: Bridging the CAD and GIS Gap in the SMCRA Window • CADD - AutoCAD Essentials • CADD - AutoCAD II Beyond the Basics • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • Erosion and Sediment Control • ESRI - Creating Story Maps with ArcGIS • ESRI – Field Data Collection and Management with ArcGIS • Introduction to GIS for Mining and Reclamation I • Introduction to GIS for Mining and Reclamation I – Distance Learning

Phase 2 Learning
• AML Realty • Blasting and Inspection • Coalfield Communications • Evidence Preparation and Testimony • Historic Archeological Resources • CAD 200: AutoCAD Map 3D for Permitting and Reclamation • CAD 201: Carlson Mining Site Design – Permitting and Reclamation • CAD 301: Carlson Mining, Field, Hydrology, and Natural Regrade for Permitting and Reclamation • CADD - AutoCAD II Beyond the Basics

- Introduction to SMCRA Inspections
- NEPA Fundamentals
- Soils and Revegetation
- Surface and Groundwater Hydrology
- Underground Mining Technology

Wetlands Awareness

Physical Scientists

Hydrologist/Geologist Series (HG)

Hydrologists and Geologists positions' main job duties fall in any or all of the following areas:

- Hydrological or geological reviews of regulatory permit applications
- Hydrological or geological evaluations of regulated mining sites
    - Before
    - During
    - Post-mining
- Hydrological evaluations of water supply complaints
- Hydrological and geological evaluation and investigations of AML-related problems
- Designs of remediation for impacts from AML-related problems

Phase 1 Learning
• Acid Forming Materials: Basic Principles and Concepts • AMD TREAT: Mine Drainage Treatment Cost Calculations • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • CADD - AutoCAD Essentials • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • ESRI - Arc Hydro: GIS for Water Resources • ESRI - ArcGIS Online: Essential Workflow • ESRI - Creating Story Maps with ArcGIS • ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS • ESRI - Migrating from ArcMap to ArcGIS Pro • ESRI - Sharing Content to ArcGIS Enterprise • Galena Slope Stability Analysis – Distance Learning • HEC-RAS

Phase 2 Learning
• Coalfield Communications • Evidence Preparation and Testimony • Expert Witness • Forensic Hydrologic Investigations • Historic Archeological Resources • Passive Treatment • Wetlands Awareness • ArcGIS Spatial Analyst: For Mining and Reclamation • CAD 301: Carlson Mining, Field, Hydrology, and Natural Regrade for Permitting and Reclamation • CADD - AutoCAD II Beyond the Basics • ESRI - ArcGIS Pro: Essential Workflows • ESRI - Creating and Editing Data with ArcGIS Pro • ESRI - Spatial Analysis with ArcGIS Pro • ESRI - Imagery Analysis in ArcGIS Pro • ESRI - Working with Parcel Data in ArcGIS Pro • ESRI - Creating Python Scripts for ArcGIS Pro ESRI - Managing Geospatial Data with ArcGIS Pro

- Introduction to Earth Vision 2D and 3D Modeling
- Introduction to SMCRA Inspections
- Modeling and Analysis with Groundwater Vistas
- Permitting Hydrology
- Quantitative Hydrogeology
- SEDCAD Applications and Extensions for Mining and Reclamation
- Surface and Groundwater Hydrology
- Testing and Analysis of Aquifer Characteristics with AQTESOLV

Underground Mining Technology

Natural/Soil Career Series (NS)

Natural or Soil Scientists work in both regulatory and AML programs where the positions would include main job duties falling in the areas of:

- Review and assessment of regulatory permit applications
- Field evaluations of regulated mining sites
    - Before
    - During
    - Post-mining
- Evaluations of citizen's complaints
- Evaluations and investigations of AML-related problems
- Designing of remediation for AML-related problems

Phase 1 Learning
• Acid Forming Materials: Principles and Concepts • Basic Inspection Workbook • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • CADD - AutoCAD Essentials • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • ESRI - Arc Hydro: GIS for Water Resources • ESRI - ArcGIS Online: Essential Workflow • ESRI - Creating Story Maps with ArcGIS • ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS • ESRI - Migrating from ArcMap to ArcGIS Pro • ESRI - Sharing Content to ArcGIS Enterprise • Evidence Preparation and Testimony • Introduction to SMCRA Inspections Soils and Revegetation

Phase 2 Learning
• Erosion and Sediment Control • Expert Witness • NEPA Fundamentals • SMCRA and ESA • Wetlands Awareness • CADD - AutoCAD II Beyond the Basics • ESRI - ArcGIS Pro: Essential Workflows • ESRI - Creating and Editing Data with ArcGIS Pro • ESRI - Spatial Analysis with ArcGIS Pro • ESRI - Imagery Analysis in ArcGIS Pro • ESRI - Working with Parcel Data in ArcGIS Pro • ESRI - Creating Python Scripts for ArcGIS Pro ESRI - Managing Geospatial Data with ArcGIS Pro

Geospatial/Mine Mapping Series (GM)

Geospatial and mine mapping positions work in the areas of:

- Geospatial mine mapping components of regulatory mine permitting reviews and assessments
- Reviews and evaluations of underground mining proposals and impacts
- Geospatial or mine mapping components of AML designs
- Preparation of Acid Mine Drainage (AMD) remediation designs and watershed evaluations
- Regulatory investigations including subsidence evaluation predictions and others

Phase 1 Learning
• Basic Inspection Workbook • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • CADD - AutoCAD Essentials • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • Enforcement Procedures • ESRI - Arc Hydro: GIS for Water Resources • ESRI - ArcGIS Online: Essential Workflow • ESRI - Creating Story Maps with ArcGIS • ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS • ESRI - Migrating from ArcMap to ArcGIS Pro • ESRI - Sharing Content to ArcGIS Enterprise Introduction to SMCRA Inspections

Phase 2 Learning
• Evidence Preparation and Testimony • Surface and Groundwater Hydrology • Underground Mining Technology • ArcGIS Spatial Analyst: For Mining and Reclamation • CADD - AutoCAD II Beyond the Basics • ESRI - ArcGIS Pro: Essential Workflows • ESRI - Creating and Editing Data with ArcGIS Pro • ESRI - Spatial Analysis with ArcGIS Pro • ESRI - Imagery Analysis in ArcGIS Pro • ESRI - Working with Parcel Data in ArcGIS Pro • ESRI - Creating Python Scripts for ArcGIS Pro ESRI - Managing Geospatial Data with ArcGIS Pro

Permit Reviewer

Permit Reviewer Series (PR)

Permit reviewers are employed in a variety of capacities within the coal regulatory arena including those whose main job functions fall in the areas of:

- Reviews and regulations of regulatory permit applications
- Field assessments of regulatory permit applications
- Review of regulatory permit revisions as they are requested or required
- Environmental assessment of regulatory permit applications and associated documentation in a variety of circumstances

Phase 1 Learning
• Acid Forming Materials: Principles and Concepts • Applied Engineering • Basic Inspection Workbook • BlueMarble - Raster & Terrain Analysis in Global Mapper • BlueMarble - Introduction to Global Mapper • BlueMarble - Lidar & Point Cloud Processing in Global Mapper • CAD 100: AutoCAD Essentials – Distance Learning • CAD 101: AutoCAD for Permitting and Reclamation • CAD 400: Bridging the CAD and GIS Gap in the SMCRA Window • CADD - AutoCAD Essentials • CADD AutoCAD Map 3D & AutoCAD Raster • Effective Writing • Enforcement Procedures • Erosion and Sediment Control • ESRI - Arc Hydro: GIS for Water Resources • ESRI - ArcGIS Online: Essential Workflow • ESRI - Creating Story Maps with ArcGIS • ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS • ESRI - Migrating from ArcMap to ArcGIS Pro

Phase 2 Learning
• Blasting and Inspection • Bonding: Administrative and Legal Aspects • Bonding: Cost Estimation • Coalfield Communications • Expert Witness • Forensic Hydrologic Investigations • SMCRA ESA • Subsidence • ArcGIS Spatial Analyst: For Mining and Reclamation • CAD 200: AutoCAD Map 3D for Permitting and Reclamation • CAD 201: Carlson Mining Site Design – Permitting and Reclamation • CAD 300: AutoCAD Map 3D with Raster Design for Underground and Surface Mine Mapping • CAD 301: Carlson Mining, Field, Hydrology, and Natural Regrade for Permitting and Reclamation • CADD - AutoCAD II Beyond the Basics • ESRI - ArcGIS Pro: Essential Workflows • ESRI - Creating and Editing Data with ArcGIS Pro • ESRI - Spatial Analysis with ArcGIS Pro • ESRI - Imagery Analysis in ArcGIS Pro • ESRI - Working with Parcel Data in ArcGIS Pro • ESRI - Creating Python Scripts for ArcGIS Pro

- ESRI - Sharing Content to ArcGIS Enterprise
- Evidence Preparation and Testimony
- Excess Spoil and Disposal
- Galena Slope Stability Analysis – Distance Learning
- Historic Archeological Resources
- Introduction to Earth Vision 2D and 3D Modeling
- Introduction to GIS for Mining and Reclamation I
- Introduction to GIS for Mining and Reclamation I – Distance Learning
- Introduction to SMCRA Inspections
- NEPA Fundamentals
- Permit Finding Workshop
- Permitting Hydrology
- Soils and Revegetation
- Surface and Groundwater Hydrology
- Underground Mining Technology

Wetlands Awareness

- ESRI - Managing Geospatial Data with ArcGIS Pro

Non-Technical

Attorney Series (AT)

Attorneys' main job duties fall in any of the following areas:

- Defense of State or Federal agency regulatory and/or AML actions
- Policy review for State or Federal macro-agencies
- State program reviews for OSMRE
- Regulation drafting
- General counsel for State, Federal, or Tribal agencies
- Legal research

Phase 1 Learning
• Acid-Forming Materials: Principles and Concepts • Basic Inspection Workbook • Enforcement Procedures • Evidence Preparation and Testimony • Introduction to SMCRA Inspections • Soils and Revegetation Surface and Groundwater Hydrology

Phase 2 Learning
• Blasting and Inspection • Erosion and Sediment Control • Expert Witness • NEPA Fundamentals • Permitting Hydrology Underground Mining Technology

Program Manager/Supervisory Series (PM)

Management and supervisory positions include those whose main job duties fall in the areas of:

- Management of personnel and programs in the coal regulatory programs within OSMRE, State, and Tribal agencies
- Management of personnel and programs within the abandoned mine land portions of OSMRE, State, and Tribal agencies

Program management or supervisory positions cover a wide variety of positions within the macro-agencies. In some instances, the positions require in addition to personnel management technical expertise in the subject-related fields being administered. The courses identified for this career series are recommended as initial courses that would benefit a new manager or supervisor who needs a basic understanding of the components of regulatory and AML-related programs.

Expanded career development training for managers or supervisors should be chosen using the course description catalog for both the National Technical Training Program (NTTP) and the Technical Information and Professional Service (TIPS) programs, in conjunction with the career series documents for the specific positions or programs being administered.

Phase 1 Learning
• AML Reclamation Projects • Basic Inspection Workbook • Coalfield Communications • Effective Writing • Evidence Preparation and Testimony • Introduction to SMCRA Inspections • NEPA Fundamentals

Program Administrative Support Personnel (AS)

Administrative Support Personnel can benefit from the basic introductory technical courses, in particular, the Basic Inspection Workbook and Effective Writing courses. In Regulatory and AML agency programs, additional career development courses should be selected using the course description catalogs in concert with specific career series courses. Course selection should be based on the level of expertise appropriate for the program support provided by the position.

Recommended Prerequisites

To get the right folks into advanced courses, OSMRE Training recommends a specific sequence of training for the students. The following section lists the desired course, followed by the prerequisite Courses(s) or other activities.

NTTP Course Recommended Prerequisites:

Desired Course	Prerequisite(s)
Advanced Blasting: Investigation and Analysis of Adverse Effects	Completed Blasting and Inspection course
Evidence Preparation and Testimony	Completed Enforcement Procedures course
Expert Witness	• Created Expert Technical Opinion Reports • Completed Enforcement Procedures course • Completed Evidence Preparation and Testimony course • ArcGIS Spatial Analyst: For Mining and Reclamation
Passive Treatment: Theory and Application Workshop	Completed Acid-Forming Materials: Basic Principles and Concepts course
Quantitative Hydrogeology	Completed Surface Groundwater and Hydrology course
Subsidence	Completed Underground Mining Technology course

TIPS Course Recommended Prerequisites:

Desired Course	Prerequisite(s)
AMD TREAT: Mine Drainage Treatment Cost Calculations	Familiarity with active and passive AMD treatment and treatment cost bonding estimation is desirable
ArcGIS Spatial Analyst: For Mining and Reclamation	Completed Introduction to ArcGIS for Mining and Reclamation
Blasting Log Evaluation Program (BLEP) – Distance Learning	• Completed Blasting and Inspection course or • Experienced in blast design and log documentation
CAD 100: AutoCAD Essentials – Distance Learning	Familiarity with computers and Windows OS
CAD 101: AutoCAD for Permitting and Reclamation	Knowledge of maps and drafting concepts required
CAD 200: AutoCAD Map 3D for Permitting and Reclamation	Working knowledge of AutoCAD or MUST have taken CAD101: AutoCAD for Permitting and Reclamation
CAD 201: Carlson Mining Site Design – Permitting and Reclamation	Working knowledge of AutoCAD or MUST have taken CAD101: AutoCAD for Permitting and Reclamation
CAD 300: AutoCAD Map 3D with Raster Design for Underground and Surface Mine Mapping	Working knowledge of AutoCAD or AutoCAD Map 3D, helpful if have taken CAD200: AutoCAD Map 3D for Permitting and Reclamation
CAD 301: Carlson Mining, Field, Hydrology, and Natural Regrade for Permitting and Reclamation	Working knowledge of Carlson Mining or should have taken CAD201: Carlson Mining Site Design for Permitting and Reclamation
CAD 400: Bridging the CAD and GIS Gap in the SMCRA Window	Working knowledge of AutoCAD Map 3D and/or ArcGIS
Galena Slope Stability Analysis – Distance Learning	Familiarity with slope stability and science and engineering principles
Introduction to earth vision 2D and 3D Modeling	Experience with GIS and scientific and engineering principles
Introduction to GIS for Mining and Reclamation I	Familiarity with GIS
Introduction to GIS for Mining and Reclamation I – Distance Learning	Familiarity with GIS
Modeling and Analysis with Groundwater Vistas	• Working knowledge of hydrologic terminology and concepts • Completed Quantitative Hydrogeology
Testing and Analysis of Aquifer Characteristics with AQTESOLV	Working knowledge of hydrologic terminology and concepts
BlueMarble - Raster & Terrain Analysis in Global Mapper	• Working knowledge and experience with Global Mapper or • Completion of the Introduction to Global Mapper course

BlueMarble - Lidar & Point Cloud Processing in Global Mapper	• Working knowledge and experience with Global Mapper or • Completion of the Introduction to Global Mapper course
BlueMarble - Working with LiDAR ArcGIS	Advanced users who have mastered the basics
CADD - AutoCAD II Beyond the Basics	Experienced AutoCAD users
CADD AutoCAD Map 3D & AutoCAD Raster	Experienced AutoCAD users
ESRI – Field Data Collection and Management with ArcGIS	Advanced ArcGIS users
ESRI - Migrating from ArcMap to ArcGIS Pro	Experienced ArcMap users
ESRI - Creating and Editing Data with ArcGIS Pro	Advanced ArcGIS users
ESRI - Spatial Analysis with ArcGIS Pro	Advanced ArcGIS users
ESRI - Arc Hydro: GIS for Water Resources	• Experienced ArcMap • ArcGIS Pro users
ESRI - Sharing Content to ArcGIS Enterprise	Advanced ArcGIS users
ESRI - Hydrologic and Hydraulic Analysis Using ArcGIS	• Experienced ArcGIS Pro or • ArcMap and HEC-RAS users
ESRI - Imagery Analysis in ArcGIS Pro	• Experienced ArcMap users and • ArcGIS Pro users
ESRI - Working with Parcel Data in ArcGIS Pro	Advanced ArcGIS users
Creating Python Scripts for ArcGIS Pro	Advanced ArcGIS users
ESRI - Creating Story Maps with ArcGIS	Advanced ArcGIS users
ESRI - Managing Geospatial Data with ArcGIS Pro	Advanced ArcGIS users