COURSE OVERVIEW DE0036
Subsurface Mapping
(E-Learning Module)

Course Title
Subsurface Mapping (E-Learning Module)

Course Reference
DE0036

Course Format & Compatibility
SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)

Course Duration
30 online contact hours
(3.0 CEUs/30 PDHs)

Course Description

This E-Learning course is designed to provide participants with a detailed and up-to-date overview of subsurface mapping. It covers the geologic mapping and geologic cross section; the geologic problems; the geologic mapping steps and results of reconnaissance; the mapping of rock outcrops comprising of sedimentary rocks and volcanic rocks; the types of faults and other structures; the mapping of geothermal manifestations; the active manifestations and extinct manifestations; the hydrothermal eruption features and discharge features of mapping; and the aerial photography in mapping, surface mapping methods and results of geologic mapping.

During this course, participants will learn the heat flux measurement using infrared thermography; the surface pressure measurement using pressure; the pressure sensitivity of luminescence and the composition of a PSP coating; the intensity measurement method and lifetime method; the sources of errors; the binary paint and TSP principle; and the unsteady PSP measurements, model deformation measurement and wall friction measurement using the oil droplet technique.

Course Objectives

After completing the course, the employee will:-

- Apply and gain a comprehensive knowledge on subsurface mapping
- Discuss geologic mapping and identify geologic cross section and geologic problems
- Demonstrate geologic mapping steps and review results of reconnaissance
- Perform mapping of rock outcrops comprising of sedimentary rocks and volcanic rocks
- Identify faults including its types and other structures as well as carryout mapping of geothermal manifestations
- Differentiate active manifestations and extinct manifestations and describe hydrothermal eruption features and discharge features of mapping
- Apply aerial photography in mapping, surface mapping methods as well as review results of geologic mapping
- Carryout heat flux measurement using infrared thermography and surface pressure measurement using pressure
- Determine the pressure sensitivity of luminescence including the composition of a PSP coating
- Apply intensity measurement method and lifetime method as well as identify the sources of errors
- Discuss binary paint and TSP principle, unsteady PSP measurements, model deformation measurement and wall friction measurement using the oil droplet technique

Who Should Attend

This course provides an overview of all significant aspects and considerations of subsurface mapping for development geoscientists and those who are exploring mature areas, early-career geoscientists and technologists who make structure maps and those who need to judge the validity of maps and cross sections.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 1-2013 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Fee

As per proposal

Training Methodology

This Trainee-centered course includes the following training methodologies:-

- Talking presentation Slides (ppt with audio)
- Simulation & Animation
- Exercises
- Videos
- Case Studies
- Gamification (learning through games)
- Quizzes, Pre-test & Post-test

Every section/module of the course ends up with a Quiz which must be passed by the trainee in order to move to the next section/module. A Post-test at the end of the course must be passed in order to get the online accredited certificate.

Course Contents

- Introduction to Surface Geological Mapping
- Geologic Mapping
- Geologic Cross Section
- Geologic Problems
- Geologic Mapping Steps
- Results of Reconnaissance
- Field Work/Geological Mapping
- Photos of Field Equipment
- Geological Mapping
- In Field Logistics
- What to Map
- Mapping Rock Outcrops: Sedimentary Rocks
- Mapping Rock Outcrops: Volcanic Rocks
- Faults
- Difficulty of Mapping Volcanic Rocks
- Volcanic Rocks
- Geologic Sampling

- What to do with Samples
- Mapping Faults: Types of Faults
- Mapping Faults
- Identification of Faults
- Other Structures
- Mapping Geothermal Manifestations
- Active Manifestations
- Extinct Manifestations
- Mapping Hydrothermal Eruption Features
- Mapping Discharge Features
- Aerial Photography in Mapping.
- Aerial Photography
- Results of Geologic Mapping
- Surface Mapping Methods
- Heat Flux Measurement Using Infrared Thermography
- Infrared Thermography: Uncertainty
- Surface Pressure Measurement Using Pressure
- Pressure Sensitivity of Luminescence
- Composition of a PSP Coating
- Intensity Measurement Method
- Lifetime Method
- Sources of Errors
- Instrumentation
- Binary Paint and TSP Principle
- Pressure Sensitive Paint: Uncertainty
- Example of Applications
- Unsteady PSP Measurements
- Camera Calibration
- Model Deformation Measurement
- Wall Friction Measurement Using the Oil Droplet Technique

- Topographic Maps
- What is a Topographic Map?
- What Information is on a Topographic Map?
- Is a Topographic Map Similar to a Road Map?
- What do the Colours Mean?
- What are Contour Lines?
- What is Scale?
- How do I Measure Distance on a Map?
- What is a Grid?
- How can I Find or Express a Location on a Map?
- How do I Find a Grid Reference?
- How can I Determine Where I am on a Map
- Using a GPS Receiver?
- How can I Determine Where I am on a Map Without Using a GPS?
- How do I Navigate with a Compass and a Topographic Map?
- How are Map Sheet Areas Defined?
- How do I Know Which Map Sheet I Need?
- Where can I Obtain a topographic Map?
- Topographic Terminology
- Surface Observation and Geologic Mapping
- Introduction
- Duties of the Geologist
- Active Slides Versus Stable Slopes
- Work Required Before Field Visitation
- Area of Interest
- Geologic and Geotechnical Information
- Aerial Photographs
- Topographic Maps
- On-Site Engineering-Geologic Investigations
- Reconnaissance Observations

- Engineering-Geologic Mapping
- Reconnaissance Instrumentation and Surveying
- Surveys Of Landslide Sites
- Purposes of Ground Surveys
- Movement Grids and Traverses
- Surveying Methods
- Representation of Topographic Data
- Interpretation and Data Presentation
- Importance of Multiple Working Hypotheses
- Analysis of Reconnaissance Instrumentation
- Engineering-Geologic Maps and Explanations
- Engineering-Geologic Sections
- Three-Dimensional Representations
- Engineering-Geologic Reports
- Guidance for Subsurface Investigations
- Correlation of Surface and Subsurface Data
- Additional Field Information
- Cost of Surface Investigations
- Geologic Maps
- Useful Items on Geologic Maps
- Exercise Part 1 (do before lab): Visualizing Geology in 3-D with Online Program
- Exercise Part 2: Inspecting Geologic Maps in the Lab Room
- An Introduction to Geological Maps
- Why Use a Map of Mt Todd?
- The Map
- The Map Face
- The Legend
- Rock Types
- The Age of Rocks
- Groups and Formations

- Finniss River Group (Burrell Creek Formation)
- Cullen Granite
- Geological Time Line
- Katherine River Group
- Symbols
- Geological Reliability Diagram
- Geological Cross-sections
- Cross-sections and Geological Histories
- Diagrammatic Relationship of Rock Units
- Reading the Map Face - Geological Structures
- Folds
- Faults
- Unconformities
- Intrusions
- Geology and Topography
- Landfonns
- Weathering and Erosion
- Geological Structures
- Folds
- Flat-lying Beds
- Faults
- How to Read a Topographic Map
- Latitude, Longitude and Grid References
- Legend
- Climatic Information
- Vegetation and Geology
- Landuse and Geology
- Economic Geology
- Deposit Geology
- Mt Todd Gold Mine

- Aboriginal Perspective
- Traditional Areas around Edith Falls
- Australian Geological Survey Organisation
- Geological Map Sales
- Australian Surveying & Land Information Group
- Topographic Map Sales
- Activities
- Introduction to Field Mapping of Geologic Structures
- Constructing a Geologic Map in the Field
- Common Symbols Used on Geologic Maps
- Surficial Deposits
- The Issue of Scale
- The Importance of Thinking
- Structural Measurements
- Map and Cross-Section Key (Explanation)
- Appearance
- Written Report
- Field Notes
- Grading Criteria
- Ethics in Field Work
- Data Preparation for IIMS
- Preparation of Spatial Data Infrastructure
- Preparation of GIS Data