****

**THE REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**GEOPHYSICAL EXPLORATION TECHNOLOGY**

**LEVEL 5**

|  |  |
| --- | --- |
| TVET CDACCP.O. BOX 15745-00100NAIROBI | KABETE NATIONAL POLYTECHNICP.O BOX 29010-00625NAIROBI |

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# FOREWORD

The provision of quality education and training is fundamental to the Government’s overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya’s development blueprint and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted in the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and the mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for the Extractives sector’s growth and sustainable development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING**

**MINISTRY OF EDUCATION**

# PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle-income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Extractive Sector Skills Advisory Committee (SSAC) and Kabete National Polytechnic have developed this curriculum.

This curriculum has been developed following the CBET framework policy; the CBETA Standards and guidelines provided by the TVET Authority and the Kenya National Qualification framework designed by the Kenya National Qualification Authority.

This curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Extractives SSAC, Kabete National Polytechnic, expert workers and all those who participated in the development of this curriculum.

**CHAIRPERSON, TVET CDACC**

# ACKNOWLEDGMENT

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organisations.

I appreciate Kabete National Polytechnic for the collaboration that enabled the development of this curriculum. I recognize with appreciation the role of the Extractives Sector Skills Advisory Committee (SSAC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the Extractives sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in extractives sector acquire competencies that will enable them to perform their work more efficiently.

**COUNCIL SECRETARY/CEO**

**TVET CDACC**

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# ABBREVIATIONS AND ACRONYMS

BC Basic Competency

CBET Competency Based Education and Training

CC Common Competency

CDACC Curriculum Development, Assessment and Certification Council

CR Core Competency

CU Curriculum

EMCA Environment Management and Coordination Act

EXT Extractives

GIS Geographical Information Systems

GPE Geophysical Exploration

GPR Ground Penetrating Radar

GPS Global Positioning System

ICT Information Communication Technology

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualifications Authority

LCD Liquid Crystal Display

OSH Occupation Safety and Health

OSHA Occupation Safety and Health Act

PPE Personal Protective Equipment

SSAC Sector Skills Advisory Committee

TV Television

TVET Technical and Vocational Education and Training

TVETA Technical and Vocational Education and Training Authority

# KEY TO UNIT CODE

 **EXT /CU/GPE/BC/01/ 5/A**

Industry or sector

Curriculum

Occupational area

Type of competency

Competency number

Competency level

Version control

# COURSE OVERVIEW

Geophysical Exploration Technology Level 5 qualification consists of competencies that an individual must achieve to provide assistance to a geophysical exploration technician. This involves surveying area: geology, density, magnetism, seismicity and resistivity and conducting geophysical well logging.

The units of learning for Geophysical Exploration Technology Certificate level 5 qualifications include the following:

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| EXT/CU/GPE/BC/01/5A | Communication skills | 25 | 2.5 |
| EXT/CU/GPE/BC/02/5A | Digital literacy | 45 | 4.5 |
| EXT/CU/GPE/BC/03/5A | Entrepreneurial skills | 70 | 7.0 |
| EXT/CU/GPE/BC/04/5A | Employability skills | 50 | 5.0 |
| EXT/CU/GPE/BC/05/5A | Environmental literacy | 25 | 2.5 |
| EXT/CU/GPE/BC/06/5A | Occupational safety and health practices | 25 | 2.5 |
| **Total** | **240** | **24.0** |

**Common units of learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| EXT/CU/GPE/CC/01/5A | Mathematics for geophysical exploration | 120 | 12.0 |
| EXT/CU/GPE/CC/02/5A | Chemistry for geophysical exploration | 90 | 9.0 |
| EXT/CU/GPE/CC/03/5A | Physics for geophysical exploration | 150 | 15.0 |
| **Total** | **360** | **36.0** |

**Core Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| EXT/CU/GPE/CR/01/5A | Area geology | 180 | 18.0 |
| EXT/CU/GPE/CR/02/5A | Gravity survey | 90 | 9.0 |
| EXT/CU/GPE/CR/03/5A | Magnetic survey  | 90 | 9.0 |
| EXT/CU/GPE/CR/04/5A | Seismic survey | 90 | 9.0 |
| EXT/CU/GPE/CR/05/5A | Resistivity survey | 150 | 15.0 |
| EXT/CU/GPE/CR/06/5A | Geophysical well logging | 90 | 9.0 |
|  | Industrial attachment  | 360 | 36.0 |
| **Total** | **1050** | **105.0** |
| **GRAND TOTAL** | **1650** | **165.0** |

The total duration of the course is 1650 hours.

**Entry Requirements**

An individual entering this course should have any of the following minimum requirements:

1. Kenya Certificate of Secondary Education (KCSE) mean grade D (plain)

**Or**

1. Any other qualifications as determined by Kenya National Qualifications Authority (KNQA)

**Field attachment**

An individual enrolled in this course will undergo a field attachment for a period of 360 hours in the extractives sector.

**Trainer qualification**

A trainer for this course should have a higher qualification than the level of this course

**Assessment**

The course will be assessed at two levels:

1. **Internal assessment**: conducted continuously by the trainer (internal assessor) who is monitored by an accredited internal verifier.
2. **External assessment:** conducted by an accredited external assessor who is monitored by an accredited external verifier.

The assessors and verifiers are registered by TVET CDACC which also coordinates external assessment.

**Certification**

An individual will be awarded a Certificate of Competency on demonstration of competence in a unit of competency. To be awarded Certificate in Geophysical Exploration Technology Level 5, an individual must demonstrate competence in all the units of competency in the qualification pack.

These certificates will be awarded by TVET CDACC in conjunction with Kabete National Polytechnic.

# BASIC UNITS OF LEARNING

# COMMUNICATION SKILLS

**UNIT CODE:** EXT/CU/GPE/BC/01/5/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 25hours

**Unit Description**

This unit covers the competencies required to demonstrate communication skills. It involves meeting communication needs of clients and colleagues, contributing to the development of communication strategies, conducting workplace interviews, facilitating group discussions and representing the organisation.

**Summary of Learning Outcomes**

1. Meet communication needs of clients and colleagues
2. Contribute to the development of communication strategies
3. Conduct interviews
4. Facilitate group discussions
5. Represent the organization

**Learning Outcomes, Content and Methods of Assessment**

| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| --- | --- | --- |
| 1. Meet communication needs of clients and colleagues
 | * Communication process
* Modes of communication
* Medium of communication
* Effective communication
* Barriers to communication
* Flow of communication
* Sources of information
* Organizational policies
* Organization requirements for written and electronic communication methods
* Report writing
* Effective questioning techniques (clarifying and probing)
* Workplace etiquette
* Ethical work practices in handling communication
* Active listening
* Feedback
* Interpretation
* Flexibility in communication
 | * Interview
* Third party reports
* Written texts
 |
| 1. Contribute to the development of communication strategies
 | * Dynamics of groups
* Styles of group leadership
* Openness and flexibility in communication
* Communication skills relevant to client groups
 | * Written
* Observation
 |
| 1. Conduct interviews
 | * Types of interview
* Establishing rapport
* Facilitating resolution of issues
* Developing action plans
 | * Written
* Observation
 |
| 1. Facilitate group discussions
 | * Identification of communication needs
* Dynamics of groups
* Styles of group leadership
* Presentation of information
* Encouraging group members participation
* Evaluating group communication strategies
 | * Written
* Observation
 |
| 1. Represent the organization
 | * Presentation techniques
* Development of a presentation
* Multi-media utilization in presentation
* Communication skills relevant to client groups
 | * Observation
* Written
 |

**Suggested Methods of Instruction**

* Role playing
* Viewing of related videos

**Recommended Resources**

* Desktop computers/laptops
* Internet connection
* Projectors
* Telephone

# NUMERACY SKILLS

**UNIT CODE:** EXT/CU/GPE/BC/02/5/A

**Relationship to Occupational Standards:**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers the competencies required to demonstrate numeracy skills. It involves calculating with whole numbers and familiar fractions, decimals, and percentages for work estimating, measuring, and calculating with routine metric measurements for work, using routine maps and plans for work, interpreting, drawing and constructing 2D and 3D shapes for work, interpreting routine tables, graphs and charts for work, collecting data and constructing routine tables and graphs for work and using basic functions of calculator

**Summary of Learning Outcomes**

1. Calculate with whole numbers and familiar fractions, decimals and percentages for work
2. Estimate, measure and calculate with routine metric measurements for work
3. Use routine maps and plans for work
4. Interpret, draw and construct 2D and 3D shapes for work
5. Interpret routine tables, graphs and charts for work
6. Collect data and construct routine tables and graphs for work
7. Use basic functions of calculator

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Calculate with whole numbers and familiar fractions, decimals and percentages for work
 | * Interpretation of whole numbers, fractions, decimals, percentages and rates
* Calculations involving several steps
* Calculation with whole numbers and routine or familiar fractions, decimals and percentages
* Conversion between equivalent forms of fractions, decimals and percentages
* Application of order of operations to solve multi-step calculations
* Application of problem solving strategies
* Making estimations to check reasonableness of problem solving process, outcome and its appropriateness to the context and task
* Use of formal and informal mathematical language and symbolism to communicate the result of a task
 | * Written
* Practical test
* Observation
 |
| 1. Estimate, measure and calculate with routine metric measurements for work
 | * Selection and interpretation of measurement information in workplace tasks and texts
* Identification and selection of routine measuring equipment
* Estimation and making measurements using correct units
* Estimation and calculation using routine measurements
* Performing conversions between routinely used metric units
* Using problem solving processes to undertake tasks
* Recording information using mathematical language and symbols
 | * Written
* Practical test
* Observation
 |
| 1. Use routine maps and plans for work
 | * Identification of features in routine maps and plans
* Symbols and keys used in routine maps and plans
* Identification and interpretation of orientation of map to North
* Demonstrate understanding of direction and location
* Apply simple scale to estimate length of objects, or distance to location or object
* Give and receive directions using both formal and informal language
 | * Written
* Practical test
* Observation
 |
| 1. Interpret, draw and construct 2D and 3D shapes for work
 | * Identify two dimensional shapes and routine three-dimensional shapes in everyday objects and in different orientations
* Explain the use and application of shapes
* Use formal and informal mathematical language and symbols to describe and compare the features of two-dimensional shapes and routine three-dimensional shapes
* Identify common angles
* Estimate common angles in everyday objects
* Use formal and informal mathematical language to describe and compare common angles
* Use common geometric instruments to draw two dimensional shapes
* Construct routine three-dimensional objects from given nets
 |  • Written• Practical test• Observation |
| 1. Interpret routine tables, graphs and charts for work
 | * Identify routine tables, graphs and charts in predominately familiar texts and contexts
* Identify common types of graphs and their different uses
* Identify features of tables, graphs and charts
* Locate specific information
* Perform calculations to interpret information
* Explain how statistics can inform and persuade
* Identify misleading statistical information
* Discuss information relevant to the workplace
 | * Oral
* Written
* Practical test
* Observation
 |
| 1. Collect data and construct routine tables and graphs for work
 | * Identify features of common tables and graphs
* Identify uses of **different tables and graphs**
* Determine data and variables to be collected
* Determine audience
* Select a method to collect data
* Collect data
* Collate information in a table
* Determine suitable scale and axes
* Draft and draw graph to present information
* Check that data meets the expected results and context
* Report or discuss information using formal and informal mathematical language
 | * Written
* Practical test
* Observation
 |
| 1. Use basic functions of calculator
 | * Identify and use keys for basic functions on a calculator
* Calculate using whole numbers, money and routine decimals and percentages
* Calculate with routine fractions and percentages
* Apply order of operations to solve multi-step calculations
* Interpret display and record result
* Make estimations to check reasonableness of problem solving process, outcome and its appropriateness to the context and task
* Use formal and informal mathematical language and appropriate symbolism and conventions to communicate the result of the task
 | * Written
* Practical test
* Observation
 |

**Suggested Methods of Instruction**

* Demonstrations
* Role playing
* Viewing of related videos
* Discussion
* Assignments

**Recommended resources**

* Calculators
* Basic measuring instruments

# DIGITAL LITERACY

**UNIT CODE:** EXT/CU/GPE/BC/03/5/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 45 hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy. It involves identifying appropriate computer software and hardware, applying security measures to data, hardware, software in automated environment, applying computer software in solving tasks, applying internet and email in communication at workplace, applying desktop publishing in official assignment and preparing presentation packages.

**Summary of Learning Outcomes**

1. Identify computer software and hardware
2. Apply security measures to data, hardware, software in automated environment
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace
5. Apply desktop publishing in official assignments
6. Prepare presentation packages

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Identify computer hardware and software
 | * Concepts of ICT
* Functions of ICT
* History of computers
* Components of a computer
* Classification of computers
 | * Written tests
* Oral presentation
* Observation
 |
| 1. Apply security measures to data, hardware and software
 | * Data security and control
* Security threats and control measures
* Types of computer crimes
* Detection and protection against computer crimes
* Laws governing protection of ICT
 | * Written tests
* Oral presentation
* Observation
* Project
 |
| 1. Apply computer software in solving tasks
 | * Operating system
* Word processing
* Spread sheets
* Data base design and manipulation
* Data manipulation, storage and retrieval
 | * Oral questioning
* Observation
* Project
 |
| 1. Apply internet and email in communication at workplace
 | * Computer networks
* Network configurations
* Uses of internet
* Electronic mail (e-mail) concept
 | * Oral questioning
* Observation
* Oral presentation
* Written report
 |
| 1. Apply desktop publishing in official assignments
 | * Concept of desktop publishing
* Opening publication window
* Identifying different tools and tool bars
* Determining page layout
* Opening, saving and closing files
* Drawing various shapes using DTP
* Using colour pellets to enhance a document
* Inserting text frames
* Importing and exporting text
* Object linking and embedding
* Designing of various publications
* Printing of various publications
 | * Oral questioning
* Observation
* Oral presentation
* Written report
* Project
 |
| 1. Prepare presentation packages
 | * Types of presentation packages
* Procedure of creating slides
* Formatting slides
* Presentation of slides
* Procedure for editing objects
 | * Oral questioning
* Observation
* Oral presentation
* Written report
* Project
 |

**Suggested Methods of Instruction**

* Demonstration
* Viewing of related videos
* Discussions
* Assignments
* Direct instructions

**Recommended Resources**

* Computers
* Other digital devices
* Printers
* Storage devices
* Internet access
* Computer software

# ENTREPRENEURIAL SKILLS

**UNIT CODE:** EXT/CU/GPE/BC/04/5/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurship

**Duration of unit:** 70 hours

**Unit Description**

This unit covers the competencies required to demonstrate understanding of entrepreneurship. It involves demonstrating understanding of an entrepreneur, entrepreneurship and self-employment. It also involves identifying entrepreneurship opportunities, creating entrepreneurial awareness, applying entrepreneurial motivation and developing business innovative strategies.

**Summary of Learning Outcomes**

* 1. Demonstrate understanding of an entrepreneur
	2. Demonstrate knowledge of entrepreneurship and self-employment
	3. Identify entrepreneurship opportunities
	4. Create entrepreneurial awareness
	5. Apply entrepreneurial motivation
	6. Develop innovative business strategies
	7. Develop Business plan

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Demonstrate knowledge of entrepreneurship and self-employment
 | * Importance of self-employment
* Requirements for entry into self-employment
* Role of an Entrepreneur in business
* Contributions of Entrepreneurs to National development
* Entrepreneurship culture in Kenya
* Born or made entrepreneurs
 | * Individual/group assignments
* Projects
* Written tests
* Oral questions
* Third party report
* Interviews
 |
| 1. Identify entrepreneurship opportunities
 | * Business ideas and opportunities
* Sources of business ideas
* Business life cycle
* Legal aspects of business
* Assessment of product demand
* Business environment
* Factors to consider when evaluating business environment
* Technology in business
 | * Individual/group assignments
* Projects
* Written tests
* Oral questions
* Third party report
* Interviews
 |
| 1. Create entrepreneurial awareness
 | * Forms of businesses
* Sources of business finance
* Factors in selecting source of business finance
* Governing policies on Small Scale Enterprises (SSEs)
* Problems of starting and operating SSEs
 | * Individual/group assignments
* Projects
* Written tests
* Oral questions
* Third party report
* Interviews
 |
| 1. Apply entrepreneurial motivation
 | * Internal and external motivation
* Motivational theories
* Self-assessment
* Entrepreneurial orientation
* Effective communications in entrepreneurship
* Principles of communication
* Entrepreneurial motivation
 | * Case studies
* Individual/group assignments
* Projects
* Written tests
* Oral questions
* Third party report
* Interviews
 |
| 1. Develop business innovative strategies
 | * Innovation in business
* Small business Strategic Plan
* Creativity in business development
* Linkages with other entrepreneurs
* ICT in business growth and development
 | * Case studies
* Individual/group assignments
* Projects
* Written tests
* Oral questions
* Third party report
* Interviews
 |
| 1. Develop Business Plan
 | * Business description
* Marketing plan
* Organizational/Management
* plan
* Production/operation plan
* Financial plan
* Executive summary
* Presentation of Business Plan
 | * Case studies
* Individual/group assignments
* Projects
* Written tests
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Project
* Case studies
* Field trips
* Discussions
* Demonstration
* Question and answer
* Problem solving
* Experiential
* Team training

**Recommended Resources**

* Case studies
* Business plan templates
* Computers
* Overhead projectors
* Internet
* Mobile phone
* Video clips
* Films
* Newspapers and Handouts
* Business Journals
* Writing materials

# EMPLOYABILITY SKILLS

**UNIT CODE:** EXT/CU/GPE/BC/05/5/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 50 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating interpersonal communication, critical safe work habits, leading a workplace team, planning and organizing work, maintaining professional growth and development, demonstrating workplace learning, problem solving skills and managing workplace ethics.

**Summary of Learning Outcomes**

1. Conduct self-management

2. Demonstrate interpersonal communication

3. Demonstrate critical safe work habits

4. Lead small teams

5. Plan and organize work

6. Maintain professional growth and development

7. Demonstrate workplace learning

8. Demonstrate problem solving skills

9. Demonstrate workplace ethics

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Conduct self-management
 | * Self-awareness
* Formulating personal vision, mission and goals
* Strategies for overcoming life challenges
* Emotional intelligence
* Assertiveness versus aggressiveness
* Expressing personal thoughts, feelings and beliefs
* Developing and maintaining high self-esteem
* Developing and maintaining positive self-image
* Articulating ideas and aspirations
* Accountability and responsibility
* Good work habits
* Self-awareness
* Self-development
* Financial literacy
* Healthy lifestyle practices
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate interpersonal communication
 | * Meaning of interpersonal communication
* Listening skills
* Types of audience
* Writing skills
* Reading skills
* Meaning of empathy
* Understanding customers’ needs
* Establishing communication networks
* Sharing information
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate critical safe work habits
 | * Stress and stress management
* Punctuality and time consciousness
* Leisure
* Integratingpersonal objectives into organizational objectives
* Resources utilization
* Setting work priorities
* HIV and AIDS
* Drug and substance abuse
* Handling emerging issues
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Lead a small team
 | * Leadership qualities
* Team building
* Determination of team roles and objectives
* Team performance indicators
* Responsibilities in a team
* Forms of communication
* Complementing team activities
* Gender and gender mainstreaming
* Human rights
* Maintaining relationships
* Conflicts and conflict resolution
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Plan and organize work
 | * Functions of management
* Planning
* Organizing
* Time management
* Decision making process
* Task allocation
* Evaluating work activities
* Resource utilization
* Problem solving
* Collecting and organising information
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Maintain professional growth and development
 | * Opportunities for professional growth
* Assessing training needs
* Licenses and certifications for professional growth and development
* Pursuing personal and organizational goals
* Identifying work priorities
* Recognizing career advancement
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate workplace learning
 | * Managing own learning
* Contributing to the learning community at the workplace
* Cultural aspects of work
* Variety of learning context
* Application of learning
* Safe use of technology
* Identifying opportunities
* Generating new ideas
* Workplace innovation
* Performance improvement
* Handling emerging issues
* Future trends and concerns in learning
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate problem solving skills
 | * Problem identification
* Problem solving
* Application of problem-solving strategies
* Resolving customer concerns
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate workplace ethics
 | * Meaning of ethics
* Ethical perspectives
* Principles of ethics
* Values and beliefs
* Ethical standards
* Organization code of ethics
* Common ethical dilemmas
* Organization culture
* Corruption, bribery and conflict of interest
* Privacy and data protection
* Diversity, harassment and mutual respect
* Financial responsibility/accountability
* Etiquette
* Personal and professional integrity
* Commitment to jurisdictional laws
* Emerging issues in ethics
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |

**Suggested Methods of Instruction**

* Demonstrations
* Simulation/Role play
* Discussion
* Presentations
* Case studies
* Q&A

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors

# ENVIRONMENTAL LITERACY

**UNIT CODE:** EXT/CU/GPE/BC/06/5/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 25 hours

**Unit Description**

This unit describes the competencies required to demonstrate understanding of environmental literacy. It involves controlling environmental hazard, controlling control environmental pollution, complying with workplace sustainable resource use, evaluating current practices in relation to resource usage, identifying environmental legislations/conventions for environmental concerns, implementing specific environmental programs and monitoring activities on environmental protection/programs.

**Summary of Learning Outcomes**

1. Control environmental hazards
2. Control environmental Pollution
3. Demonstrate sustainable use of resource
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs
7. Monitor activities on Environmental protection/Programs

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** |  **Content** | **Methods of Assessment**  |
| 1. Control environmental hazards
 | * Purposes and content of Environmental Management and Coordination Act 1999
* Purposes and content of Solid Waste Act
* Storage methods for environmentally hazardous materials
* Disposal methods of hazardous wastes
* Types and uses of PPE in line with environmental regulations
* Occupational Safety and Health Standards (OSHS)
 | * Written test
* Oral questions
* Observation
 |
| 1. Control environmental Pollution control
 | * Types of pollution
* Environmental pollution control measures
* Types of solid wastes
* Procedures for solid waste management
* Different types of noise pollution
* Methods for minimizing noise pollution
 | * Written test
* Oral questions
* Observation
 |
| 1. Demonstrate sustainable resource use
 | * Types of resources
* Techniques in measuring current usage of resources
* Calculating current usage of resources
* Methods for minimizing wastage
* Waste management procedures
* Principles of 3Rs (Reduce, Reuse, Recycle)
* Methods for economizing or reducing resource consumption
 | * Written test
* Oral questions
* Observation
 |
| 1. Evaluate current practices in relation to resource usage
 | * Collection of information on environmental and resource efficiency systems and procedures,
* Measurement and recording of current resource usage
* Analysis and recording of current purchasing strategies.
* Analysis of current work processes to access information and data
* Identification of areas for improvement
 | * Written test
* Oral questions
* Observation
 |
| 1. Identify Environmental legislations/conventions for environmental concerns
 | * Environmental issues/concerns
* Environmental legislations /conventions and local ordinances
* Industrial standard /environmental practices
* International Environmental Protocols (Montreal, Kyoto)
* Features of an environmental strategy
 | * Written questions
* Oral questions
* Observation
 |
| 1. Implement specific environmental programs
 | * Community needs and expectations
* Resource availability
* 5 s of good housekeeping
* Identification of programs/Activities
* Setting of individual roles /responsibilities
* Resolving problems /constraints encountered
* Consultation with stakeholders
 | * Written questions
* Oral questions
* Observation
 |
| 1. Monitor activities on Environmental protection/Programs
 | * Periodic monitoring and Evaluation of activities
* Gathering feedback from stakeholders
* Analysing data gathered
* Documentation of recommendations and submission
* Setting of management support systems to sustain and enhance the program
* Monitoring and reporting of environmental incidents to concerned /proper authorities
 | * Oral questions
* Written tests
* Practical test
* Observation
 |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Viewing of related videos
* Project
* Assignements
* Role play

**Recommended Resources**

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Environmental Management and Coordination Act 1999
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)
* ISO standards
* Ccompany environmental management systems (EMS)
* Montreal Protocol
* Kyoto Protocol

# OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** EXT/CU/GPE/BC/07/5/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Occupational Safety and Health Practices

**Duration of Unit:** 25 hours

**Unit Description**

This unit specifies the competencies required to identify workplace hazards and risk, identify and implement appropriate control measures and implement OSH programs, procedures and policies/ guidelines

**Summary of Learning Outcomes**

1. Identify workplace hazards and risk
2. Control OSH hazards
3. Implement OSH programs

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Identify workplace hazards and risks
 | * Identification of hazards in the workplace and/or the indicators of their presence
* Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace is conducted by
* Authorized personnel or agency
* Gathering of OHS issues and/or concerns raised
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |
| 1. Control OSH hazards
 | * Prevention and control measures, including use of PPE (personal protective equipment) for specific hazards are identified and implemented
* Appropriate risk controls based on result of OSH hazard evaluation is recommended
* Contingency measures, including emergency procedures during workplace incidents and emergencies are recognized and established in accordance with organization procedures
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |
| 1. Implement OSH programs
 | * Providing information to work team about company OHS program, procedures and policies/guidelines
* Participating in implementation of OSH procedures and policies/ guidelines
* Training of team members and advice on OSH standards and procedures
* Implementation of procedures for maintaining OSH-related records
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |

**Suggested Methods of Instruction**

* Assigments
* Discussion
* Q&A
* Role play
* Viewing of related videos

**Recommended Resources**

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE) e.g.
* Mask
* Face mask/shield
* Safety boots
* Safety harness
* Arm/Hand guard, gloves
* Eye protection (goggles, shield)
* Hearing protection (ear muffs, ear plugs)
* Hair Net/cap/bonnet
* Hard hat
* Face protection (mask, shield)
* Apron/Gown/coverall/jump suit
* Anti-static suits
* High-visibility reflective vest

# COMMON UNITS OF LEARNING

# MATHEMATICS FOR GEOPHYSICAL EXPLORATION

**UNIT CODE: EXT/CU/GPE/CC/01/5/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Apply technician mathematics

**Duration of Unit:** 120 hours

**UNIT DESCRIPTION**

This unit describes the competencies required to apply Technician mathematics. It involves applying: algebra, trigonometry, calculus, statistics, mensuration and matrices.

**Summary of Learning Outcomes**

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| * 1. Apply Algebra
 | * BODMAS rule
* Indices
* Logarithms
* Solving mathematical problems
* Simultaneous equations
* Quadratic equations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| * 1. Apply Trigonometry principles
 | * Trigonometric functions
* Trigonometric rules
* Trigonometric identities
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| * 1. Apply Calculus
 | * Derivatives of algebraic functions
* Rate of change and small change
* stationery points of functions
* Integrals
	+ Algebraic functions
	+ Trigonometric functions
	+ Logarithmic functions
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| * 1. Carry out Mensuration
 | * Perimeter and areas of figures
* Volume and of Surface area of solids
* Area of irregular figures
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| * 1. Apply Statistics
 | * Measures of central tendency and dispersion
* Laws of probability
* Probability distributions
* Data analysis
* Sampling distribution
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| * 1. Apply Matrix
 | * Determinant and inverse
* Solutions of simultaneous equations
* Eigen values and Eigen vectors
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer
* Modelling

**Recommended Resources**

* Computers
* Stationery
* Charts/posters/
* Publications
* Video clips
* LCD projector
* Scientific calculators
* Internet

# CHEMISTRY FOR GEOPHYSICAL EXPLORATION

**UNIT CODE: EXT/CU/GPE/CC/02/5/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: apply chemistry principles

**Duration of Unit:** 90 hours

**UNIT DESCRIPTION**

This unit covers the competencies required to apply chemistry principles in geophysical exploration. It involves applying inorganic chemistry, organic chemistry and physical chemistry in the workplace.

**Summary of Learning Outcomes**

1. Apply inorganic chemistry
2. Apply organic chemistry
3. Apply physical chemistry

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Apply inorganic chemistry
 | * Geochemical Fundamentals
* Matter
* Isotope Geochemistry
* Atomic Structure And Bonding
* The Periodic Table
* Chemistry of Transition Elements
* Minerals and Ores
* Radioactivity and Nuclear Chemistry
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply organic chemistry
 | * Organic compounds
* Organic compounds Classifications and their nomenclature
* Biologically important organic compounds
* Organic compounds and living organisms
* Distribution of organic compounds in water and soils
* Geochemical properties of organic compounds and their role as complexing agents and adsorbent
* Sedimentary Organic Matter and Coal and Oil Formation
* Carbon cycles and climate
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply physical chemistry
 | * Chemical and Ionic Equilibrium
* Acids and Bases
* Redox Potential and its Application.
* Aqueous chemistry
 | * Written tests
* Observation
* Oral questions
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer
* Modelling

**Recommended Resources**

* Chemistry laboratory
* Computers
* Stationery
* Charts/posters/
* Publications
* Video clips
* LCD projector
* Chemicals
* Apparatus
* Equipment
* Reagents
* Laboratory manual
* Standard operating procedure
* Fire fighting equipment
* First aid kit
* PPES
	+ - Gloves
		- Gas mask
		- Lab coat
		- Closed leather shoes
		- Goggles

# PHYSICS FOR GEOPHYSICAL EXPLORATION

**UNIT CODE: EXT/CU/GPE/CC/03/5/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: apply physics principles

**Duration of Unit:** 150 hours

**UNIT DESCRIPTION**

This unit describes the competencies required apply a wide range of physics principles in geophysical exploration. It involves applying principles of: the concept of basic quantities of measurement, mechanics, thermodynamics, optics, electricity and basic electronics.

**Summary of Learning Outcomes**

1. Apply basic quantities of measurement
2. Apply principles of mechanics
3. Apply principles of thermodynamics
4. Apply principles of optics
5. Apply principles of electricity
6. Apply principles of basic electronics

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Apply basic quantities of measurement
 | * Phases of matter
* Dimensions of space
* Nature and properties of matter
* Parameters of measurement
* Concept of time
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply principles of mechanics
 | * Vectors and forces
* Statics
* Dynamics
* Machines
* Acoustics and waves
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply principles of thermodynamics
 | * Temperature scales
* Modes and rates of heat transfer
* Laws of thermodynamics
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply principles of optics
 | * Production and nature of light
* Ray optics
* Wave aspects of light
* Electromagnetic spectrum
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply principles of electricity
 | * Electrostatics
* Magnetism
* Sources of electromotive force
* Basic electric circuits
* Direct Current (D.C.) transients
* Basic electrical appliances
 | * Written tests
* Observation
* Oral questions
* Interviews
 |
| 1. Apply principles of basic electronics
 | * Semiconductor materials and the band theory
* Types of conduction
* Doping
* Semiconductor chips
* Biasing principles.
 | * Written tests
* Observation
* Oral questions
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer
* Modelling

**Recommended Resources**

* Physics laboratory
* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* Chemicals
* Apparatus
* Equipment
* Laboratory manual
* Standard operating procedure
* Fire fighting equipment
* First aid kit
* PPES
	+ - Gloves
		- Gas mask
		- Lab coat
		- Closed leather shoes
		- Goggles

# CORE UNITS OF LEARNING

# AREA GEOLOGY STUDY

**UNIT CODE: EXT/CU/GPE/CR/01/5/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Study area geology

**Duration of Unit:** 180 hours

**UNIT DESCRIPTION**

This unit covers the competencies required to study area physical geology. It involves locating geological survey area, conducting area geological survey, conducting area petrological study, collecting and preserving geological samples.

**Summary of Learning Outcomes**

1. Locate geological survey area
2. Conduct area geological survey
3. Conduct Petrological study
4. Collect geological sample
5. Preserve geological sample

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Locate geological survey area
 | * Physical geology terms and concepts
* Geological and demographic area data review
* Data and information collection and organization
* Climatic patterns
* Map reading and interpretation
* Topographical survey
* GPS operation techniques
* Planning for reconnaissance
* Identification, use and care of survey area locating tools
* Conducting a reconnaissance survey
* Safety and security
* Host community relations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Conduct area geological survey
 | * Geological terms and concepts
* Geological, GIS and remote sensing survey tools
* Geological and structural spatial data
* Physical features
* Geological structures
* Rock units
* Land cover
* Geological measurements
* Earth processes
* Types of geological structures
* Geological structure measurements
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Conduct Petrological study
 | * Types of minerals
* Properties of minerals
* Mineral composition
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Collect geological samples
 | * Sample identification and collection tools
* Sample collection procedures
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Preserve geological samples
 | * Sample preservation tools
* Sample preparation procedures
* Sample preservation and transportation
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer

**Recommended Resources**

* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* GPS
* Compass
* Clinometer
* Geological hammer
* Magnetic pencils
* Reagents
* Hardness kit
* Hand lens
* Geological maps and reports
* Satellite images
* Remote sensing data
* Bore hole records
* Aerial photos and images
* PPES
* Exploration boots
* Snake boots
* Gloves
* Rain coat
* Hat
* Dust mask
* Reflective jacket
* Helmet
* Overall

# AREA DENSITY SURVEY

**UNIT CODE: EXT/CU/GPE/CR/02/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Survey area gravity

**Duration of Unit:** 90 hours

**UNIT DESCRIPTION**

This unit covers the competencies required to survey area gravity. It involves locating gravity survey area, recording gravity survey data, handling, mounting and dismounting gravity survey equipment.

**Summary of Learning Outcomes**

1. Locate gravity survey area
2. Record gravity survey data
3. Handle gravity survey equipment
4. Mount and dismount gravity survey equipment.

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Locate gravity survey area
 | * Gravitation terms and concepts
* Geological and demographic area data review
* Data and information collection and organization
* Climatic patterns
* Gravity map reading and interpretation
* Topographical survey
* Satellite image interpretation
* GPS operation techniques
* Identification, use and care of survey area locating tools
* Reconnaissance survey
* Safety and security
* Host community relations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Recording gravity survey data
 | * Identification, use and care of density variation survey tools
* Subsurface rock density
* Geological features
* Man-made features
* Factors influencing gravity variation
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Handle gravity survey equipment
 | * Calibration of gravity equipment
* Gravity data collection
* Gravity survey procedure
* Equipment maintenance
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Mount and dismount gravity survey equipment
 | * Survey points preparation
* Mounting of survey equipment
* Dismounting of survey equipment
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer

**Recommended Resources**

* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* Gravimeter
* GPS
* Differential GPS
* Compass
* Gravity software
* PPES
* Exploration boots
* Snake boots
* Gloves
* Rain coat
* Hat
* Dust mask
* Reflective jacket
* Helmet
* Overall

# MAGNETIC SURVEY

**UNIT CODE: EXT/CU/GPE/CR/03/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Survey area magnetism

**Duration of Unit:** 90 hours

This unit covers the competencies required to survey area magnetism. It involves locating magnetic survey area, recording magnetic survey data, handling, mounting and dismounting magnetic survey equipment.

**Summary of Learning Outcomes**

1. Locate magnetic survey area
2. Record magnetic survey data
3. Handle magnetic survey equipment
4. Mount and dismount magnetic survey equipment

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Locate magnetic survey area
 | * Magnetic terms and concepts
* Geological and demographic area data review
* Data and information collection and organization
* Climatic patterns
* Magnetic map reading and interpretation
* Topographical survey
* Satellite image interpretation
* GPS operation techniques
* Identification, use and care of survey area locating tools
* Reconnaissance survey
* Safety and security
* Host community relations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Recording magnetic survey data
 | * Identification, use and care of magnetic survey tools
* Subsurface rock magnetism
* Geological features
* Man-made features
* Factors influencing magnetic variation
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Handle magnetic survey equipment
 | * Calibration of magnetic survey equipment
* Magnetic data collection
* Magnetic survey procedure
* Equipment maintenance
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Mount and dismount magnetic survey equipment
 | * Survey points preparation
* Mounting of survey equipment
* Dismounting of survey equipment
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer

**Recommended Resources**

* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* Magnetometer
* GPS
* Compass
* Magnetic software
* PPES
* Exploration boots
* Snake boots
* Gloves
* Rain coat
* Hat
* Dust mask
* Reflective jacket
* Helmet
* Overall

# AREA SEISMICITY SURVEY

**UNIT CODE: EXT/CU/GPE/CR/04/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Survey area elasticity

**Duration of Unit:**90 hours

**UNIT DESCRIPTION**

This unit covers the competencies required to survey area seismicity. It involves locating seismic survey area, recording seismic survey data, handling, mounting and dismounting seismic survey equipment.

**Summary of Learning Outcomes**

1. Locate seismic survey area.
2. Record seismic survey data.
3. Handle seismic survey equipment.
4. Mount and dismount seismic survey equipment.

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Locate seismic survey area
 | * Seismic terms and concepts
* Geological and demographic area data review
* Data and information collection and organization
* Climatic patterns
* Seismic map reading and interpretation
* Topographical survey
* Satellite image interpretation
* GPS operation techniques
* Identification, use and care of survey area locating tools
* Reconnaissance survey
* Safety and security
* Host community relations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Recording seismic survey data
 | * Identification, use and care of seismic survey tools
* Subsurface rock seismic elasticity
* Geological features
* Man-made features
* Factors influencing seismic elasticity
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Handle seismic survey equipment
 | * Calibration of seismic survey equipment
* Seismic data collection
* Seismic survey procedure
* Equipment maintenance
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Mount and dismount seismic survey equipment
 | * Survey points preparation
* Mounting of survey equipment
* Dismounting of survey equipment
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer

**Recommended Resources**

* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* Seismometer
* GPS
* Compass
* Existing data and information
* Seismic software
* PPES
* Exploration boots
* Snake boots
* Gloves
* Rain coat
* Hat
* Dust mask
* Reflective jacket
* Helmet
* Overall

# AREA RESISTIVITY SURVEY

**UNIT CODE: EXT/CU/GPE/CR/05/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: survey area resistivity

**Duration of Unit:**150 hours

**Unit Description**

This unit covers the competencies required to survey area resistivity. It involves locating resistivity survey area, recording resistivity survey data, handling, mounting and dismounting resistivity survey equipment.

**Summary of Learning Outcomes**

1. Locate resistivity survey area
2. Record resistivity survey data
3. Handle resistivity survey equipment
4. Mount and dismount resistivity survey equipment

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Locate resistivity survey area
 | * Resistivity terms and concepts
* Geological and demographic area data review
* Data and information collection and organization
* Climatic patterns
* Resistivity map reading and interpretation
* Topographical survey
* Satellite image interpretation
* GPS operation techniques
* Identification, use and care of survey area locating tools
* Reconnaissance survey
* Safety and security
* Host community relations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Recording resistivity survey data
 | * Identification, use and care of resistivity survey tools
* Subsurface rock resistivity
* Geological features
* Man-made features
* Factors influencing resistivity
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Handle resistivity survey equipment
 | * Calibration of resistivity survey equipment
* Resistivity data collection
* Resistivity survey procedure
* Equipment maintenance
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Mount and dismount resistivity survey equipment
 | * Survey points preparation
* Mounting of survey equipment
* Dismounting of survey equipment
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer

**Recommended Resources**

* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* Resistivity meter
* GPS
* Compass
* Existing data and information
* Resistivity software
* PPES
* Exploration boots
* Snake boots
* Gloves
* Rain coat
* Hat
* Dust mask
* Reflective jacket
* Helmet
* Overall

# GEOPHYSICAL WELL LOGGING

**UNIT CODE: EXT/CU/GPE/CR/06/5/A**

**Relationship to Occupational Standards**

This unit addresses the unit of competency: conduct geophysical well logging

**Duration of Unit:** 90 hours

**Unit Description**

This unit covers the competencies required to conduct geophysical well logging. It involves locating the well, preparing the well for logging, handling logging tools, mounting and dismounting logging tools.

**Summary of Learning Outcomes**

1. Locate the well
2. Prepare the well for logging
3. Handle well logging tools
4. Mount and dismount logging tools

**Learning Outcomes, Content and Methods of Assessment**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Methods of Assessment**  |
| 1. Locate the well
 | * Geophysical well logging terms and concepts
* Geological and demographic area data review
* Data and information collection and organization
* Climatic patterns
* Topographical survey
* GPS operation techniques
* Identification, use and care of survey area locating tools
* Reconnaissance survey
* Safety and security
* Host community relations
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Prepare the well for logging
 | * Evaluation of well environment
* Well access preparation
* Well preparation for logging
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Handle well logging tools
 | * Calibration of geophysical well logging tools
* Equipment maintenance
* Selection of geophysical well logging tools
* Setting up of geophysical well logging tools
* Geophysical well logging survey procedure
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |
| 1. Mount and dismount resistivity survey equipment
 | * Mounting of geophysical logging tools
* Dismounting of geophysical logging tools
 | * Written tests
* Observation
* Oral questions
* Third party report
* Interviews
 |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstrations
* Group discussion
* Presentations
* Videos
* Assignments
* Role play
* Question and answer

**Recommended Resources**

* Computers
* Stationery
* Charts/posters
* Publications
* Video clips
* LCD projector
* Resistivity meter
* Calliper
* Potentiometer
* Gamma logger tool
* Open Hole Calliper
* Acoustic log tool
* Pressure/Temperature Tools
* Geophysical log interpretation software
* GPS
* Compass
* Existing data and information
* PPES
* Exploration boots
* Snake boots
* Gloves
* Rain coat
* Hat
* Dust mask
* Reflective jacket
* Helmet
* Overall