

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**GEMMOLOGY**

**LEVEL 6**



**TVET CDACC**

**P.O. BOX 15745-00100**

**NAIROBI**

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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 Kenya’s development blue print 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 to the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of the 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 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 Gemmology 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 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET 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 Gemology Sector Skills Advisory Committee (SSAC) and Ministry of mining 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 Methods of Instruction, 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, Gemmology SSAC, 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 organizations.

I appreciate Ruiru Gikonyo institute for Technical skills for providing the finance and mobilising industry players who played a key role in enabling the development of this curriculum.

 I recognize with appreciation the role of Gemmology Sector Skills Advisory Committee (SSAC) in ensuring the competencies required by the industry are addressed in this curriculum. I also thank all stakeholders in the Gemology 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 Gemology sector acquire competencies that will enable them to perform their work more efficiently.

.

**COUNCIL SECRETTARY/CEO**

**TVET CDACC**

# ABBREVIATION AND ACRONYMS

2D Two Dimensional

AIDS Acquired Immune Deficiency Syndrome

BC Basic Competency

CC Common Competency

CDACC Curriculum Development, Assessment and Certification Council

CR Core Competency

GEM Gemmology

HIV Human Immuno-Deficiency Virus

ICT Information Communication Technology

MIN Mining

NEMA National Environmental Management Authority

OSHA Occupation Safety and Health Act

OSHS Occupation Safety and Health Standards

PESTEL Political Economic Social Technological Environmental and Legal

PPE Personal Protective Equipment

SG Specific gravity

SSAC Sector Skills Advisory Committee

SWOT Strengths Weaknesses Opportunities and Threats

TVET Technical and Vocational Education and Training

XRF X-ray fluorescence

# KEY TO UNIT CODE

 **MIN/CU/GEM/BC/01/6/A**

Industry or sector

Curriculum

Occupational area

Type of Unit

Unit number

Competency level

Control version

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# COURSE OVERVIEW

Gemmology Level 6 qualification consists of competencies that an individual must achieve to enable him/her to work in a gemstone industry. It entails units of learning such as gemstone; identification, grading, processing and designing jewellery products gemstone marketing, gemmological stone’s quality assurance and management of gemmology projects.

The units of competency comprising Gemmology Level 6 qualifications include the following:

**BASIC UNITS OF LEARNING**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/BC/01/6/A** | Communication skills | 40 | 4 |
| **MIN/CU/GEM/BC/02/6/A** | Numeracy skills | 60 | 6 |
| **MIN/CU/GEM/BC/03/6/A** | Digital literacy | 60 | 6 |
| **MIN/CU/GEM/BC/04/6/A** | Entrepreneurial skills | 100 | 10 |
| **MIN/CU/GEM/BC/05/6/A** | Employability skills | 80 | 8 |
| **MIN/CU/GEM/BC/06/6/A** | Environmental literacy | 40 | 4 |
| **MIN/CU/GEM/BC/07/6/A** | Occupational safety and health practices | 40 | 4 |
| **Total** | **420** | **42** |

**COMMON** **UNITS OF LEARNING**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/CC/01/6/A** | Geology principles  | 280 | 28 |
| **MIN/CU/GEM/CC/02/6/A** | Mining Technology | 300 | 30 |

**CORE** **UNITS OF LEARNING**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/CR/01/6/A** | Gemstone identification | 300 | 30 |
| **MIN/CU/GEM/CR/02/6/A** | Gem stone grading | 200 | 20 |
| **MIN/CU/GEM/CR/03/6/A** | Gemstone processing | 230 | 23 |
| **MIN/CU/GEM/CR/04/6/A** | Designing jewellery products | 250 | 25 |
| **MIN/CU/GEM/CR/05/6/A** | Gemstone marketing | 190 | 19 |
| **MIN/CU/GEM/CR/06/6/A** | Gemstone quality assurance | 200 | 20 |
| **MIN/CU/GEM/CR/07/6/A** | Gemmology project management | 120 | 12 |
|  | Industrial attachment | 480 | 48 |
| **Total** | **1970** | **197** |
| **Grand total** | **2970** | **297** |

The core units of learning are independent of each other and may be taken independently.

The total duration of the course is 2970 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 C- (minus)

**Or**

1. Certificate in Gemmology Level 5

**Or**

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

**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 National Certificate in Gemmology Level 6, an individual must demonstrate competence in all the units of competency.

These certificates will be awarded by TVET CDACC in conjunction with the training provider.

# BASIC UNITS OF LEARNING

## COMMUNICATION SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/01/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 40 hours

**Unit Description**

This unit covers the competencies required to demonstrate communication skills .It involves, meeting communication needs of clients and colleagues; developing communication strategies, establishing and maintaining communication pathways, conducting interviews, facilitating group discussion and representing the organization.

**Summary of Learning Outcomes**

1. Meet communication needs of clients and colleagues
2. Develop communication strategies
3. Establish and maintain communication pathways
4. Promote use of communication strategies
5. Conduct interview
6. Facilitate group discussion
7. Represent the organization

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 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
* Types of communication strategies
* Elements of communication strategy
 | * Interview
* Written texts
 |
| 1. Develop communication strategies
 | * Dynamics of groups
* Styles of group leadership
* Openness and flexibility in communication
* Communication skills relevant to client groups
 | * Interview
* Written texts
 |
| 1. Establish and maintain communication pathways
 | * Types of communication pathways
 | * Interview
* Written texts
 |
| 1. Promote use of communication strategies
 | * Application of elements of communication strategies
* Effective communication techniques
 | * Interview
* Written texts
 |
| 1. Conduct interview
 | * Types of interview
* Establishing rapport
* Facilitating resolution of issues
* Developing action plans
 | * Interview
* Written texts
 |
| 1. Facilitate group discussion
 | * Identification of communication needs
* Dynamics of groups
* Styles of group leadership
* Presentation of information
* Encouraging group members participation
* Evaluating group communication strategies
 | * Interview
* Written texts
 |
| 1. Represent the organization
 | * Presentation techniques
* Development of a presentation
* Multi-media utilization in presentation
* Communication skills relevant to client groups
 | * Interview
* Written texts
 |

**Suggested Methods of Instruction**

* Discussion
* Role playing
* Simulation
* Direct instruction

**Recommended Resources**

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

## NUMERACY SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/02/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills.

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes the competencies required to demonstrate numeracy skills. It involves applying a wide range of mathematical calculations for work; applying ratios, rates and proportions to solve problems; estimating, measuring and calculating measurement for work; using detailed maps to plan travel routes for work; using geometry to draw and construct 2D and 3D shapes for work; collecting, organizing and interpreting statistical data; using routine formula and algebraic expressions for work and using common functions of a scientific calculator.

**Summary of Learning Outcomes**

1. Apply a wide range of mathematical calculations for work
2. Apply ratios, rates and proportions to solve problems
3. Estimate, measure and calculate measurement for work
4. Use detailed maps to plan travel routes for work
5. Use geometry to draw and construct 2D and 3D shapes for work
6. Collect, organize and interpret statistical data
7. Use routine formula and algebraic expressions for work
8. Use common functions of a scientific calculator

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Apply a wide range of mathematical calculations for work
 | * Fundamentals of mathematics
* Addition, subtraction, multiplication and division of positive and negative numbers
* Algebraic expressions manipulation
* Forms of fractions, decimals and percentages
* Expression of numbers as powers and roots
 | * Written tests
* Assignments
* Supervised exercises
 |
| 1. Apply ratios, rates and proportions to solve problems
 | * Rates, ratios and proportions
* Meaning
* Conversions into percentages
* Direct and inverse proportions determination
* Performing calculations
* Construction of graphs, charts and tables
* Recording of information
 | * Written tests
* Assignments
* Supervised exercises
 |
| 1. Estimate, measure and calculate measurement for work
 | * Units of measurements and their symbols
* Identification and selection of measuring equipment
* Conversion of units of measurement
* Perimeters of regular figures
* Areas of regular figures
* Volumes of regular figures
* Carrying out measurements
* Recording of information
 | * Assignments
* Supervised exercises
* Written tests
 |
| 1. Use detailed maps to plan travel routes 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
* Planning of routes
* Calculation of distance, speed and time
 | * Written
* Practical test
 |
| 1. Use geometry to 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
* Evaluation of unknown angles
* Use formal and informal mathematical language to describe and compare common angles
* Symmetry and similarity
* Use common geometric instruments to draw two dimensional shapes
* Construct routine three dimensional objects from given nets
 |  |
| 1. Collect, organize and interpret statistical data
 | * + Classification of data
* Grouped data
* Ungrouped data
	+ Data collection
* Observation
* Recording
	+ Distinguishing between sampling and census
	+ Importance of sampling
	+ Errors in sampling
	+ Types of sampling and their limitations e.g.
* Stratified random
* Cluster
* Judgmental
	+ Tabulation of data
* Class intervals
* Class boundaries
* Frequency tables
* Cumulative frequency
	+ Diagrammatic and graphical presentation of data e.g.
* Histograms
* Frequency polygons
* Bar charts
* Pie charts
* Cumulative frequency curves
	+ Interpretation of data
 | * Assignments
* Supervised exercises
* Written tests
 |
| 1. Use routine formula and algebraic expressions for work
 | * + Solving linear equations
	+ Linear graphs
* Plotting
* Interpretation
* Applications of linear graphs
* Curves of first and second degree
* Plotting
* Interpretation
 | * Assignments
* Supervised exercises
* Written tests
 |
| 8. Use common functions of a scientific calculator | * Identify and use keys for common 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
 | * Written
* Practical test
 |

**Suggested Methods of Instruction**

* Group discussions
* Demonstration by trainer
* Practical work by trainee
* Exercises

**Recommended Resources**

* Calculators
* Rulers, pencils, erasers
* Charts with presentations of data
* Graph books
* Dice

## DIGITAL LITERACY

**UNIT CODE:** MIN/CU/GEM/BC/03/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 60 hours

**Unit Description**

This unit describes competencies required to demonstrate digital literacy. It involves in identifying computer software and hardware, applying security measures to data, hardware, software in automated environment, computer software in solving task, internet and email in communication at workplace, desktop publishing in official assignments 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 Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 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
 |
| 1. Apply security measures to data, hardware, software in automated environment
 | * 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
* 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
* Project
 |
| 1. Apply internet and email in communication at workplace
 | * Computer networks
* Network configurations
* Uses of internet
* Electronic mail (e-mail) concept
 | * Oral questioning
* 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
* 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
* Written report
* Project
 |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Project
* Group discussions

**Recommended Resources**

* Computers
* Printers
* Storage devices
* Internet access

## ENTREPRENEURIAL SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/04/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 100 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 who an entrepreneur
	2. Demonstrate knowledge of entrepreneurship and self-employment
	3. Identify entrepreneurship opportunities
	4. Create entrepreneurial awareness
	5. Apply entrepreneurial motivation
	6. Develop business innovative strategies
	7. Develop Business plan

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 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
 |
| 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
 |
| 6. 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:** MIN/CU/GEM/BC/05/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 80 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 ethical performance.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate interpersonal communication
3. Demonstrate critical safe work habits
4. Lead a workplace team
5. Plan and organize work
6. Maintain professional growth and development
7. Demonstrate workplace learning
8. Demonstrate problem solving skills
9. Manage ethical performance

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Conduct self-management
 | * Self-awareness
* Formulating personal vision, mission and goals
* Strategies for overcoming life challenges
* Managing emotions
* Emotional intelligence
* Assertiveness versus aggressiveness
* Expressing personal thoughts, feelings and beliefs
* Developing and maintaining high self-esteem
* Developing and maintaining positive self-image
* Setting performance targets
* Monitoring and evaluating performance
* Articulating ideas and aspirations
* Accountability and responsibility
* Good work habits
* Self-awareness
* Values and beliefs
* Self-development
* Financial literacy
* Healthy lifestyle practices
* Adopting safety 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
* Public speaking
* Writing skills
* Negotiation skills
* Reading skills
* Meaning of empathy
* Understanding customers’ needs
* Establishing communication networks
* Assertiveness
* Sharing information
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate critical safe work habits
 | * Stress and stress management
* Time concept
* Punctuality and time consciousness
* Leisure
* Integratingpersonal objectives into organizational objectives
* Resources mobilization
* Resources utilization
* Setting work priorities
* Developing healthy relationships
* HIV and AIDS
* Drug and substance abuse
* Managing emerging issues
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Lead a workplace team
 | * Leadership qualities
* Power and authority
* Team building
* Determination of team roles and objectives
* Team parameters and relationships
* Individual responsibilities in a team
* Forms of communication
* Complementing team activities
* Gender and gender mainstreaming
* Human rights
* Developing healthy relationships
* Maintaining relationships
* Conflicts and conflict resolution
* Coaching and mentoring skills
 | * 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 concept
* Task allocation
* Developing work plans
* Developing work goals/objectives and deliverables
* Monitoring work activities
* Evaluating work activities
* Resource mobilization
* Resource allocation
* Resource utilization
* Proactive planning
* Risk evaluation
* Problem solving
* Collecting, analysing and organising information
* Negotiation
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Maintain professional growth and development
 | * Avenues for professional growth
* Training and career opportunities
* Assessing training needs
* Mobilizing training resources
* Licenses and certifications for professional growth and development
* Pursuing personal and organizational goals
* Managing work priorities and commitments
* Recognizing career advancement
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate workplace learning
 | * Managing own learning
* Mentoring
* Coaching
* Contributing to the learning community at the workplace
* Cultural aspects of work
* Networking
* Variety of learning context
* Application of learning
* Safe use of technology
* Taking initiative/proactivity
* Flexibility
* Identifying opportunities
* Generating new ideas
* Workplace innovation
* Performance improvement
* Managing emerging issues
* Future trends and concerns in learning
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Demonstrate problem solving skills
 | * Critical thinking process
* Data analysis tools
* Decision making
* Creative thinking
* Development of creative, innovative and practical solutions
* Independence in identifying and solving problems
* Solving problems in teams
* Application of problem-solving strategies
* Testing assumptions
* Resolving customer concerns
 | * Written tests
* Oral questioning
* Interviewing
* Portfolio of evidence
* Third party report
 |
| 1. Manage ethical performance
 | * Meaning of ethics
* Ethical perspectives
* Principles of ethics
* 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
* Group Discussion
* Presentations
* Assignments
* Q&A

**Recommended Resources**

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

## ENVIRONMENTAL LITERACY

**UNIT CODE**:MIN/CU/GEM/BC/06/6/A

**Relationship to Occupational Standards**:

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 40 hours

**Unit Description**

This unit describes the competencies required demonstrate environmental literacy.it involves controlling environmental hazard, controlling 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, monitoring activities on environmental protection/programs, analysing resource use and developing resource conservation plans.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
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
8. Analyze resource use
9. Develop resource conservation plans

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** |  **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard
 | * Purposes and content of Environmental Management and Coordination Act 1999
* 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 questions
* Oral questions
 |
| 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 questions
* Oral questions
* Role play
 |
| 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 questions
* Oral questions
* Role play
 |
| 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 questions
* Oral questions
* Role play
 |
| 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
 |
| 1. Implement specific environmental programs
 | * Community needs and expectations
* Resource availability
* 5s of good housekeeping
* Identification of programs/Activities
* Setting of individual roles /responsibilities
* Resolving problems /constraints encountered
* Consultation with stakeholders
 | * Written questions
* Oral questions
* Role play
 |
| 1. Monitor activities on Environmental protection/Programs
 | * Periodic monitoring and Evaluation of activities
* Gathering feedback from stakeholders
* Analyzing 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
 |
| 1. Analyze resource use
 | * Identification of resource consuming processes
* Determination of quantity and nature of resource consumed
* Analysis of resource flow through different parts of the process.
* Classification of wastes for possible source of resources.
 | * Written tests
* Oral questions
* Practical test
 |
| 1. Develop resource Conservation plans
 | * Determination of efficiency of use/conversion of resources
* Causes of low efficiency of use of resources
* Plans for increasing the efficiency of resource use
 | * Written tests
* Oral questions
* Practical test
 |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Practical demonstration of tasks by trainer
* Practice by trainees
* Observations and comments and corrections by trainers

**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
* Company environmental management systems (EMS)
* Montreal Protocol
* Kyoto Protocol

## OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** MIN/CU/GEM/BC/07/6/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 40 hours

**Unit Description**

This unit specifies the competencies required to demonstrate occupational health and safety practices. It involves identifying workplace hazards and risk, identifying and implementing appropriate control measures to hazards and risks and implementing 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 Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 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
* Gathering of OSH issues and/or concerns
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |
| 1. Control OSH hazards
 | * Prevention and control measures e.g. use of PPE
* Risk assessment
* Contingency measures
 | * Oral questions
* Written tests
* Portfolio of evidence
* Third party report
 |
| 1. Implement OSH

 programs | * Company OSH program, evaluation and review
* Implementation of OSH programs
* 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

##  GEOLOGY PRINCIPLES

**UNIT CODE:** MIN/CU/GEM/CC/01/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Understand geology principles**

**Duration of Unit:** 280 hours

**Unit Description**

This unit specifies the competencies required to understand geology principles It involves understanding rocks and minerals, mineral crystal systems, geology of Kenya, deposits and weathering of rocks and minerals

**Summary of Learning Outcomes**

1. Understand rocks and minerals
2. Understand mineral crystal systems
3. Understand geology of Kenya
4. Understanding ore deposits
5. Understand weathering of rocks and minerals

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Understand rocks and minerals
 | * Definition
* Rocks
* Minerals
* Crystals
* Formation of rocks and minerals
* Types and classification of rocks and minerals
* Rock forming processes
* Bowen’s reaction series
* Properties of minerals
 | * Oral questions
* Written tests
* Practical
 |
| 1. Understand mineral crystal systems
 | * Unit cell
* Crystallography
* Different types of crystal systems
* Examples of crystal forms
* Sketching crystal systems and crystal forms
* Definition and process of polymerization
* Silicates
 | * Oral questions
* Written tests
* Practical test
* Observation
 |
| 1. Understand geology of Kenya
 | * Geological time scale
* Geological map of Kenya
* Archean/ Greenstone belt rocks
* Pretozoic/ Mozambique Belt
* Sedimentary basin of Coast region, North Eastern region, Rift Valley and the Kaviando Rift around L. Victoria
* Tertiary and quaternary volcanic in the Rift Valley
* Igneous intrusive in various parts of the country
 | * Oral questions
* Written tests
* Practical test
* Observation
 |
| 1. Understanding ore deposits
 | * Geology of Kenya
* Mineralization environment
* Classification of ore deposits
* Global tectonics
* Ore formation processes
* Ore genesis
* Ore grading
* Polished section
* Estimation and costing of the ore
* Socio-economic dynamics
* Socio-political dynamics
* Case studies
 | * Oral questions
* Written tests
* Practical test
* Observation
* Field trip
 |
| 1. Understand weathering of rocks and minerals
 | * Differentiate weathering and erosion
* Rock cycle
* Types of weathering
* Agents of weathering
* Factors that affect weathering rates
* End products of weathering
 | * Oral questions
* Written tests
* Practical
* Observation
 |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Field trip

**Recommended Resources**

* Reference materials
* Geological laboratory
* Crystallography models
* Sample rocks
* Geological tools
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)
* Internet

## MINING TECHNOLOGY

**UNIT CODE:** MIN/CU/GEM/CC/01/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Understand geology principles**

**Duration of Unit:** 300 hours

**Unit Description**

This unit specifies the competencies required to understand mining technology. It involves understanding basic geotechnical properties, mining methods and mineral processing, mine safety and health practises, environmental impacts of mining and basic mineral economics and value chain.

**Summary of Learning Outcomes**

1. Understand basic geotechnical properties
2. Understand mining methods and mineral processing
3. Understand mine safety and health practices
4. Understand Environmental impacts of mining
5. Understand basic mineral economics and value chain

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Understand basic geotechnical properties
 | * Terms and concepts
* Basic geology and mineralogy
* Sampling techniques for geotechnics
* Basic geotechnical strength tests and result interpretation
* Report writing
 | * Oral questions
* Written tests
* Practical test
* Observation
* Field trips
 |
| 1. Understand mining methods and mineral processing
 | * Geotechnical properties of host rock and mineral ore
* Types of mining methods
* Metallurgical properties of ore
* Types of mineral processing/ beneficiation methods
 | * Oral questions
* Written tests
* Practical test
* Observation
* Field trips
 |
| 1. Understand mine safety and health practices
 | * Minerals with potential hazards to health
* Hazards associated with open cast and underground mining
* Hazards associated with types of mineral processing/ beneficiation methods
* Occupation safety and health
 | * Oral questions
* Written tests
* Practical test
* Observation
* Field trip
 |
| 1. Understand Environmental impacts of mining
 | * Establishing baseline survey of potential mining area
* Operational impacts
	+ Noise pollution
	+ Dust
	+ Vibrations
	+ Mine waste water
	+ Occupation safety and health
* Mine closure
	+ Backfilling of pits
	+ Alternative use of pits
	+ Re-vegetation
	+ Alternative use of mine infrastructure
* Legislative framework around mining sector
 | * Oral questions
* Written tests
* Practical test
* Observation
* Field trip
 |
| 1. Understand basic mineral economics and value chain
 | * Supply and demand of minerals
* Mineral price cycle and forecasting
* Managing mineral benefits
 | * Oral questions
* Written tests
* Practical
* Observation
 |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Practical work by trainee
* Viewing of related videos
* Field trip

**Recommended Resources**

* Reference materials
* Geotechnical laboratory
* Sample rocks
* Geotechnical tools
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)
* Internet

# CORE UNITS OF LEARNING

## GEMSTONE IDENTIFICATION

**UNIT CODE:** MIN/CU/GEM/CR/01/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Carryout gemstone identification**

**Duration of Unit:** 300 hours

**Unit Description**

This unit specifies the competencies required to carry out gemstone identification. It involves performing thermal test, identifying gemstone colour, performing hardness test, identifying gemstone optical properties, performing specific gravity test, testing refractive index, conducting optical microscopic test, performing polarity, XRF and dichroscopic test.

**Summary of Learning Outcomes**

1. Perform thermal test
2. Identify gemstone color
3. Perform hardness test
4. Illuminate gemstone optical properties
5. Perform specific gravity test
6. Test refractive index
7. Conduct optical microscopic test
8. Perform polarity test
9. Perform XRF test
10. Perform dichroscope test

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Perform thermal test
 | * + Definition of gemstone
	+ Properties of gemstone
	+ Classification and types of gemstones
	+ Thermal inertia principles
	+ Thermal conductivity of different materials
 | * + Practical
	+ Written tests
	+ Observation
	+ Oral questioning
	+ Third party report
 |
| 1. Identify gemstone colour
 | * + Standard colour chart
	+ Electromagnetic spectrum
	+ Factors affecting colour in gemstones
	+ Types of coloured gemstones
	+ Tools and equipment for colour enhancing in identification
 | * + Practical
	+ Written tests
	+ Observation
	+ Oral questioning
	+ Third party report
 |
| 1. Perform hardness test
 | * + Definition of hardness
	+ Tools and equipment for hardness test
	+ Moh’s hardness kit
	+ Hardness testing procedure
	+ Hardness result recording and interpretation
 | * + Practical
	+ Written tests
	+ Observation
	+ Oral questioning
	+ Third party report
 |
| * + Identify gemstone optical properties
 | * + Optical properties of gemstone
	+ Tools and equipment
	+ Recording of results for optical properties of gemstone
 | * + Practical
	+ Observation
	+ Oral tests
 |
| 1. Perform specific gravity test
 | * + Definition of specific gravity
	+ Specific gravity formula
	+ Tools and equipment for measuring specific gravity
	+ Procedure of performing SG
	+ Precision and accuracy of handling SG equipment
	+ Computing reading obtained from the procedure
	+ Recording and interpretation of SG
 | * Practical
* Written tests
* Observation
 |
| 1. Test refractive index
 | * + Properties of light under different media
	+ Introduction to Snell’s law
	+ Refractive properties of gemstones
	+ Tools and equipment for refractive index test
	+ Procedure of testing refractive index in gemstones
	+ Birefringence computations.
	+ Reading, recording and interpretation of refractive index
 | * Practical
* Written tests
* Observation
* Oral tests
 |
| 1. Conduct optical microscopic test
 | * + Optical properties of gemstones observable under microscope
	+ Gemological microscope
	+ Operation and handling of Gemological microscope
	+ Safety and handling of tools and equipment
	+ Recording and interpreting observations
 | * Practical
* Written tests
* Observation
* Oral tests
 |
| 1. Perform polarity test
 | * + Definition of polarity in gemstones
	+ Principles of polariscope
	+ Procedure of testing polarity
	+ Recording and interpreting observation.
 | * Practical
* Written tests
* Observation
* Oral tests
 |
| 1. Perform XRF test
 | * + Principles of XRF
	+ Types of XRF
	+ Chemical composition of various gemstones
	+ Operation and application of XRF in gemology
	+ Safety and handling of XRF
	+ Procedure for conducting XRF test
	+ Interpretation of results
 | * Practical
* Written tests
* Observation
* Oral tests
 |
| 1. Perform pleochroism test
 | * + Introduction to pleochroism in gemstones
	+ Principles of dichroscope
	+ Safety and handling of dichroscope
	+ Procedure for performing pleochroism test
	+ Recording and interpreting observation.
 | * Practical
* Written tests
* Observation
* Oral tests
 |

**Suggested Methods of Instruction:**

* Direct instruction
* Project
* Case studies
* Discussions
* Demonstration by trainer
* Practice by the trainee
* Projection
* Notes taking
* Drawing illustrations

**Recommended Resources:**

* Gemstone sample
* Gem cloth
* Microscope
* Refractometer
* Dichroscope
* Polariscope
* spectroscope
* Tweezers or a gem holder
* Small glass dishes
* Callipers or a micrometre
* Weighing scale
* Light source
* Hardness Pencils
* Hydrostatic Balance beam scale
* Loupe(10x)
* Crystal Models
* Refractive index Fluid
* Glassware

## GEM STONE GRADING

**UNIT CODE:** MIN/CU/GEM/CR/02/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Perform Gemstone grading**

**Duration of Unit:** 200 hours

**Unit Description**

This unit specifies the competencies required to perform gemstone grading. It involves grading gemstone by clarity, grading gemstone by cut, grading gemstone by colour and grading gemstone by carat weight.

**Summary of Learning Outcomes**

1. Grade gemstone by clarity
2. Grade gemstone by cut
3. Grade gemstone by Colour
4. Grade gemstone by carat weight

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Grade gemstone by clarity
 | * Introduction to grading of gemstones according to 4C’s
* Definition of clarity
* Gemstone defects and features
* Observation of gemstone clarity under different tools
* Loupe
* Microscope
* Hand lens
* Spot light
* Recording of gemstone clarity results.
* Gemstone Clarity grading according to Gemology Institute of America (GIA)
 | * Practical
* Written tests
* Observation
* Oral questioning
* Third party report
 |
| 1. Grade gem stone by cut
 | * Gemstone cutting
* Types of gemstone cut
* Safety measures when cutting gemstones
* Gemstone cutting equipment and consumables
* Diamond grading by cut
* Gemstone grading by cut
* Recording grading by cut results
* GIA standards of gemstone/diamond cuts
 | * Written tests
* Practical
* Observation
* Oral tests
* Note taking
* Third party report
 |
| 1. Grade gem stone by Colour
 | * Gemstone Identification chart
* Colours of gemstones
* Gemstone properties enhanced by colour
* Electromagnetic spectrum
* Colour description in gemstone
* Hue
* Transparency
* Tone
* Saturation
* Observation of gemstone clarity under different light
* Gemstone tools and equipment for aiding colour grading
* Recording grading by colour
 | * Written tests
* Observation
* Oral test
* Third party report
* Note taking
 |
| 1. Grade by carat weight
 | * Definition of carats
* Units of measurement and conversion
* Gemstone carat weighing balance
* Recording grading by carat weight
 | * Practical
* Written
* Observation
* Oral questioning
* Third party report
 |

**Suggested Methods of Instruction:**

* Direct instruction
* Project
* Case studies
* Discussions
* Demonstration by trainer
* Practice by the trainee
* Projection

**List of Recommended Resources:**

* Tweezers
* Gem identification chart
* Loupe
* Light source
* Polariscope
* Polishing powder
* Faceting machine
* Microscope
* Weighing Balance
* Gemstone (Pearl, Coral, Amber)
* Reference materials

## GEMSTONE PROCESSING

**UNIT CODE:** MIN/CU/GEM/CR/03/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Carry out gemstone processing**

**Duration of Unit:** 230 hours

**Unit Description**

This unit specifies the competencies required to carry out gemstone processing. It involves identifying gemmological stones, performing gemstone cutting, conducting gemstone pre-shaping, performing gemstone faceting, performing gemstone polishing and performing gemstone treatment.

**Summary of Learning Outcomes**

1. Identify gemological stones
2. Conduct gemstone pre-shape
3. Perform gemstone cutting
4. Perform gemstone polishing
5. Perform gemstone treatment

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify gemstones
 | * Basics of Gemology
* Definition of gemstone
* Classification of gemstones
* Properties of gemstone
* Gemstones in Kenya
* Gem identification tests
* Thermal test
* Hardness test
* Optical microscopic test
* Specific gravity
* Refractive index test
* Transparency test
* Safety measures when handling tools and equipment
* Results recording and interpretation according to GIA standards
 | * Written tests
* Practical
* Observation
* Oral questioning
* Interviewing
 |
| 1. Conduct gemstone pre-shape
 | * Concept of pre-shape
* Pre-shape equipment and its use
* Safety measures when handling equipment
* Procedure for pre-shaping
 | * Written tests
* Practical
* Observation
* Oral questioning
 |
| 1. Perform gemstone cutting
 | * Gemstone cutting
* Types of gemstone cut
* Personal safety measures when cutting gemstones
* Gemstone cutting equipment and consumables
* Safety measures when handling equipment
* Gemstone defects and features
* Procedure for gemstone cutting
 | * Written tests
* Practical
* Observation
* Oral test
* Third party report
 |
| 1. Perform gemstone polishing
 | * Concept of polishing
* Types of polishing powder
* Gem faceting machine, consumables and their operation
* Safety measures when handling equipment and consumables
* Procedure of polishing gemstones
* Procedure of handling polished gemstones
 | * Written tests
* Practical’s
* Observation
* Oral questioning
* Third party report
 |
| 1. Perform gemstone treatment
 | * Introduction to gemstone treatment
* Types of gemstone treatment
* Gemstone treatment equipment’s, consumables and their uses
* Safety measures during treatment
* Advantages and disadvantages of gemstone treatment
* Procedures of carrying out different gemstone treatments
* Ethics involving gemstone treatment
* Identification of treated gemstones
 | * Written tests
* Practicals
* Observation
* Oral questioning
* Third party report
 |

**Suggested Methods of Industry:**

* Direct instruction
* Benchmarking
* Project
* Case studies
* Discussions
* Demonstration by trainer
* Practice by the trainee

**Recommended Resources:**

* Gemstone sample
* refractometer
* Gem cloth
* Microscope
* Tweezers or a gem holder
* Callipers or a micrometre
* Light source
* Hydrostatic balance beam scale
* Loupe(10x)
* Refractive index fluid
* Gem faceting machine
* Gem polishing plates
* Abrasives
* Treatment chemicals and heat source
* Polariscope
* Dichroscope
* X-ray fluorescence

## CRAFTING JEWELLERY

**UNIT CODE:** MIN/CU/GEM/CR/04/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Crafting jewellery products**

**Duration of Unit:** 250 hours

**Unit Description**

This unit specifies the competencies required to design jewellery products. It involves identifying required materials, crafting jewellery product, conducting jewellery finishing and packaging jewellery products.

**Summary of Learning Outcomes**

1. Identify required materials
2. Craft jewellery products
3. Conduct jewellery finishing
4. Package jewellery products

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify required materials
 | * Basic concepts of jewellery
* Jewellery materials and products
* Crafting tools and equipment
* Types of jewellery design
* Types of alloys
 | * Practical’s
* Written tests
* Observation
* Oral tests
* Third party report
 |
| 1. Craft jewellery products
 | * Terms and concepts
* Introduction to jewellery crafting skills
* Toolbox, equipment and materials for crafting
* Mounting types and sizes
* Safety measures
* Jewellery crafting methods and procedures
* Traditional methods
* Modern methods
 | * Practical’s
* Written tests
* Observation
* Oral tests
* Third party report
 |
| 1. Conduct jewellery finishing
 | * Mounting tools, equipment and consumables
* Safety measures when mounting
* Methods of jewellery finishing
* Finishing procedures
 | * Practical’s
* Written tests
* Observation
* Oral questioning
 |
| 1. Package jewellery products
 | * Packaging materials
* Packaging procedures
* Safety measures when packaging
* Design, shapes and sizes of packaging material
* Care and handling of jewellery
* Storage and safety of jewellery
 | * Practical’s
* Written tests
* Observation
* Oral questioning
 |

**Suggested Methods of Instruction:**

* Direct instruction
* Project
* Case studies
* Field trips
* Discussions
* Demonstration by trainer
* Practice by the trainee
* projection

**Recommended Resources:**

* Precious Metals
* Non-precious metal
* Alloys
* Punch
* Yardsticks
* Hammers
* Mattocks
* Chisel
* Saws
* Grinders
* Jewellery design
* Jewellery mountings
* Gemstone samples
* Gem cloth
* Cutting tools
* Pliers
* Smelters
* Files
* Fasteners
* Polishing tools
* Bending tools
* Tweezers or a gem holder
* Small glass dishes
* Stone line upright
* Callipers or a micrometre
* Scale
* Light source
* Tweezers
* Samples of rough & cut gemstone

## GEMSTONE MARKETING

**UNIT CODE:** MIN/CU/GEM/CR/05/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Carryout gemstone marketing**

**Duration of Unit: 190** hours

**Unit Description**

This unit specifies the competencies required to perform gemstone marketing. It involves identifying gemmological stones, understanding mine to market value chain, understanding world market prices, establishing linkages with suppliers and advertising gemstone products.

**Summary of Learning Outcomes**

1. Identify gemmological stones
2. Understand mine to market value chain
3. Understand world market prices
4. Establish linkages with suppliers
5. Advertise gemstone products
6. Distribute gemstone products

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify gemmological stones
 | * Basics of Geology
* Definition of gemstone and precious metals
* Properties of gemstones
* Classification of gemstones
* Gem identification tests
* Thermal test
* Hardness test
* Optical microscopic test
* Specific gravity
* Refractive index test
* Transparency test
* Gemstones in Kenya
* Safety and handling of tools and equipment
* Results recording and interpretation according to GIA standards
 | * Written tests
* Observation
* Oral questioning
* Interviewing
* Third party report
 |
| 1. Understand mine to market value chain
 | * Principles of economics
* Law of demand and supply
* Supply chain knowledge
* Market Awareness
* Grading gemstones
* Diamond grading
* Gemstone Valuation based on 4Cs
* Valuation other than 4Cs
* Place of origin/source
* Size of gemstones
* Rarity of gemstones
* Precious metals
* Heat treatments
* Consumer preferences
* Export tariffs and regulations
* Regulatory bodies and licensing
* Ethical mining
* Future trends and concepts
 | * Written tests
* Practical tests
* Observation
* Oral questioning
* Interviewing
* Third party report
 |
| 1. Understand world market prices
 | * Law of demand and supply
* Factors affecting gemstone pricing
* Market awareness
* GIA pricing standards
* Trade organisations
 | * Observation
* Oral questioning
* Third party report
* Projects
 |
| 1. Establish linkages with suppliers
 | * Sourcing of gemstones’
* Types of agreement/contracts
* Future trends and concepts
* Trade organisations
 | * Written tests
* Observation
* Oral questioning
* Interviewing
* Third party report
* Projects
 |
| 1. Advertise gemstone products
 | * Introduction to Advertising
* Forms of Advertisement
* Importance of Advertising
* Future trends in Advertising
 | * Written tests
* Observation
* Interviewing
* Third party report
* Practical test
* Projects
 |
| 1. Distribute gemstone products
 | * Economic distribution line
* Types of distribution channels
* Role of distributors, wholesalers, retailers, brokers and agents
 | * Written tests
* Observation
* Interviewing
* Third party report
* Practical test
 |

**Suggested Methods of Instruction:**

* Direct instruction
* Role play
* Case studies
* Discussions
* Practice by the trainee
* Assignments

**Recommended Resources**

* Microscope
* Gauges and calipers
* Tweezers and stone holders
* Loupe
* Refractometer
* Gemstone samples
* Hydrostatic balance
* Gem identification chart
* Reference materials

##  GEMOLOGY STONES QUALITY ASSURANCE

**UNIT CODE:** MIN/CU/GEM/CR/06/6/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Carryout gemological stones quality assurance**

**Duration of Unit:** 200 hours

**Unit Description**

This unit specifies the competencies required to operate gemmological machines and equipment. It involves preparing work pieces, preparing workstation, setting up machines and equipment, performing machine operations and identifying faulty machines

**Summary of Learning Outcomes**

1. Identify gemstone international standards
2. Identify gemstone certification bodies
3. Test gemstones
4. Understand ethical mining

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify gemstone international standards
 | * Introduction to gemstone international standards
* Why are international standards employed in gemstone sectors
* Some of the common universal international standards employed across the globe
* What qualifies a gemstone as of international standards
* How international standards affect pricing
 | * Written tests
* Oral testing
* Third party report
 |
| 1. Identify gemstone certification bodies
 | * Introduction to Trade Unions and Certified bodies for governing the gemstone sector
* The roles of trade unions and the certified bodies
* Differences and similarities in the roles, standardization, market control and benefits of trade unions and certified bodies
 | * Written tests
* Oral test
* Third party report
 |
| 1. Test gemstones
 | * Introduction to testing gemstones with accordance to international standards
* Various tools and equipment for gemstone testing
* Safety and precautions in handling tools and equipment for gemstone testing
* Procedures for testing gemstones for international standards
* Qualifying gemstones as international standards gemstones
* Reporting and handling of tested gemstones
 | * Written tests
* Oral test
* Third party report
* practical
 |
| 1. Understand ethical mining
 | * Introduction to ethical and responsible mining
* Components of ethical mining
* Best practices for responsible and ethical mining
* Introduction to the mining Act
* Components of the Mining Act that govern ethical and responsible mining.
 | * Written tests
* Oral test
* Third party report
 |

**Suggested Methods of Instruction:**

* Direct instruction
* Case studies
* Field trips
* Discussions
* Demonstration by trainer
* Practice by the trainee
* Mining act 2016
* Journals, editorials and magazines

**Recommended Resources:**

* + Computer and internet
	+ Stationery
	+ Gemstones
	+ Gemological instruments and equipment
	+ Digital camera

## GEMMOLOGY PROJECT MANAGEMENT

**UNIT CODE:** MIN/CU/GEM/CR/06/6/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: **Manage gemmology projects**

**Duration of Unit:** 120 hours

**Unit description**

This unit describes the competencies required by a technician in order to manage gemmology projects. It involves identifying gemmology project, coordinating activities for gemmology projects, coordinating personnel for gemmology projects, analysing and documenting gemmology project activities

**Summary of Learning Outcomes**

1. Identify gemology project
2. Coordinate activities for gemology projects
3. Coordinate personnel for gemology projects
4. Analyze and documents gemology project activities

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

|  |  |  |
| --- | --- | --- |
| **Learning outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify gemology projects
 | * Principles and practices of management
* Project procurement technology
* Project technologies
* Project technical resources
* Risk analysis
* Consultation
* Identification of project phases
* Regulations in gemmology projects
 | * Observation
* Written
* Oral
* Practical
 |
| 1. Coordinate activities for gemology projects
 | * Action plan development
* Work scheduling
* Tools, and equipment storage
* Material handling
* Time management
* Operations management
* Principles of monitoring and evaluation
 | * Observation
* Written
* Oral
* Practical
 |
| 1. Coordinate personnel for gemology projects
 | * Human resource management
* Delegation of tasks and duties
* Staff appraisal
* Roster management
* Communication skills and technology
* Governance and ethics
 | * Practical
* Oral
* Observation
* Written
 |
| 1. Analyze and documents gemology project activities
 | * Project analysis
* Project adjustments
* Record keeping
* Project reporting
* Project documentation
 | * Observation
* Written
* Oral
* Practical
 |

**Suggested Methods of Instruction**

* Presentations and practical demonstrations by trainer;
* Guided learner activities and research to develop underpinning knowledge;
* Supervised activities and projects in a workshop;

**Recommended Resources**

* Computers
* Projectors
* Workstation
* Reference materials
* Internet connections