

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**GEMMOLOGY**

**LEVEL 3**



**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, Gemology 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.

**Dr. LAWRENCE GUANTAI M’ITONGA, PhD**

**COUNCIL SECRETTARY/CEO**

**TVET CDACC**

# ABBREVIATION AND ACRONYMS

2D Two Dimensional

4C Clarity, Cut, Colour, Carat weight

AIDS Acquired Immune Deficiency Syndrome

BC Basic Competency

CC Common Competency

CDACC Curriculum Development, Assessment and Certification Council

CR Core Competency

GEM Gemmology

GIA Gemology Institute of America

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

# KEY TO UNIT CODE

**MIN/CU/GEM/BC/01/3/A**

Industry or sector

Curriculum

Occupational area

Type of Unit

Unit number

Competency level

Control version

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# COURSE OVERVIEW

Gemmology technician certificate Level 3 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, processing and crafting jewellery products

The units of competency comprising Gemmology certificate level 3 qualifications include the following:

**BASIC UNITS OF LEARNING**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/BC/01/3/A** | Communication skills | 15 | 1.5 |
| **MIN/CU/GEM/BC/02/3/A** | Numeracy skills | 15 | 1.5 |
| **MIN/CU/GEM/BC/03/3/A** | Digital literacy | 20 | 2.0 |
| **MIN/CU/GEM/BC/04/3/A** | Entrepreneurial skills | 40 | 4.0 |
| **MIN/CU/GEM/BC/05/3/A** | Employability skills | 20 | 2.0 |
| **MIN/CU/GEM/BC/06/3/A** | Environmental literacy | 15 | 1.5 |
| **MIN/CU/GEM/BC/07/3/A** | Occupational safety and health practices | 15 | 1.5 |
| **Total** | | **140** | **14.0** |

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/CC/01/3/A** | Geology principles | 100 | 10.0 |

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/CR/01/3/A** | Gemstone identification | 100 | 10.0 |
| **MIN/CU/GEM/CR/03/3/A** | Gemstone processing | 120 | 12.0 |
| **MIN/CU/GEM/CR/04/3/A** | Crafting jewellery products | 80 | 8.0 |
| **Total** | | **600** | **60.0** |
| **Grand total** | | **540** | **84.0** |

**Entry Requirements**

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

1. Kenya certificate of primary education (KCPE) and/or Kenya certificate of secondary education (KCSE).
2. Kenya National Qualifications Authority (KNQA) level 1 or 2 certificate

**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 3, 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/01/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate communication skills. It involves, obtaining and conveying workplace information, speaking English at a basic operational level, participating in workplace meetings and discussions, and completing relevant work-related documents.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Speak English at a basic operational level
3. Participate in workplace meetings and discussions
4. Complete relevant work-related documents

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Obtain and convey workplace information | * Communication process * Modes of communication * Medium of communication * Effective communication * Barriers to communication * Flow of communication * Sources of information * Types of questions * Organizational policies * Workplace etiquette * Ethical work practices in handling communication | * Written tests * Oral questioning |
| 1. Speak English at a basic operational level | * English grammar   + Nouns, verbs, adjectives, adverbs, pronouns prepositions * English speaking   + Pronunciation   + Simple conversations * Taking verbal instructions * Reading and writing in English * Forms of expression in English | * Written tests * Oral * Role play |
| 1. Participate in workplace meetings and discussions | * Nature of workplace meetings * Meeting protocols * Workplace interactions | * Oral questioning * Written tests |
| 1. Complete relevant work-related documents | * Types and purposes of workplace documents and forms * Methods used in filling forms and documents * Recording workplace data * Process of distributing workplace forms and documents * Report writing * Types of workplace reports | * Written tests * Oral questioning |

**Suggested Methods of Instruction**

* Discussion
* Role play
* Brainstorming
* Viewing of related videos
* Role play

**Recommended Resources**

* Desktop computers/laptops
* Projectors
* Report writing templates
* Pens
* Notebooks

## NUMERACY SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/02/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit covers the competencies required to identify and undertake simple numerical processes. The person who is competent in this unit shall be able to use / work with whole numbers and money up to one hundred thousand; Locate, compare and use highly familiar measurement; Use highly familiar maps and diagrams; Identify and use some common 2D shapes; and locate specific Information in highly familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Use whole numbers for work
2. Locate, compare and use highly familiar measurement for work
3. Use highly familiar maps and diagrams for work
4. Identify and use some common 2D shapes for work
5. Locate specific Information in highly familiar tables, graphs and charts for work

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Use whole numbers for work | * Whole numbers * Use of Zeros * Use of halves * Sizes * Grouping of numbers * Addition and subtraction of whole numbers * Numerical information, * Symbols | * Written tests * Assignments * Supervised exercises |
| 1. Locate, compare and use highly familiar measurement for work | * Measurements * Units of measurements and their use * Digital time am and pm * Calendars | * Written tests * Assignments * Supervised exercises |
| 1. Use highly familiar maps and diagrams for work | * Use of Maps and * Diagrams simple * symbols and pictorial * Giving simple oral directions to locate objects | * Oral * Assignments * Supervised exercises |
| 1. Identify and use some common 2D shapes for work | * Two dimensional shapes * Describe common objects in terms of size and shape * Compare objects * Group common objects based on shape, size, color and features | * Written tests * Assignments * Supervised exercises |
| 1. Locate specific Information in highly familiar tables, graphs and charts for work | * Simple tables * Features of simple graphs and charts * Numerical information in tables, graphs & charts | * Oral * Assignments * Supervised exercises |

**Suggested Methods of Instructions**

* Instructor led facilitation of theory.
* Practical demonstration of tasks by trainer
* Role play
* Discussion
* Demonstration by trainees and comments and corrections by trainers

**Recommended Resources**

* Common 2D shapes objects
* Calculator
* Basic measuring instruments
* Mathematical tables

## DIGITAL LITERACY

**UNIT CODE:** MIN/CU/GEM/BC/03/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving tasks and applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer hardware and software
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify computer hardware and software | * Definition of a computer * Functions of a computer * Components of a computer * Classification of computers * Computer software | * Written tests * Practice assignments |
| 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 | * Written tests * Oral presentation |
| 1. Apply computer software in solving tasks | * Operating systems * Word processing * Spread sheets * Data base | * Oral questioning * Practical |
| 1. Apply internet and email in communication at workplace | * Computer networks * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Oral presentation * Written test |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* Assignments
* Viewing of related videos
* Group discussions

**Recommended Resources**

* Desk top computers
* Laptop computers
* Other digital devices
* Printers
* Storage devices
* Internet access
* Computer software

## ENTREPRENEURIAL SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/04/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 40 hours

**Unit description**

This unit describes the competencies required to demonstrate entrepreneurial competencies. It involves, developing entrepreneurial culture, identifying entrepreneurial opportunities, starting, operating and growing a small business.

**Summary of Learning Outcomes**

1. Develop entrepreneurial culture
2. Identify entrepreneurial opportunities
3. Start a small business
4. Operate a small business
5. Grow a small business

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Develop entrepreneurial culture | * Definition of entrepreneur * Importance of entrepreneurship * Common terminologies in entrepreneurship * Entrepreneurship and employment creation * Formal and informal employment * Habits that promote entrepreneurial development * Cultural factors that inhibit entrepreneurship | * Individual/group assignments * Written tests * Oral |
| 1. Identify entrepreneurial opportunities | * Types, characteristics, qualities & role of entrepreneurs * SWOT analysis * Generating Business ideas * Business opportunities * Evaluation of business opportunities | * Individual/group assignments * Written tests * Oral questioning * Oral presentation |
| 1. Start a small business | * Factors to consider when starting a small business * Legal requirement for starting a small business * Procedure of starting a small business * The dos and don’ts of starting a small business * Challenges faced when starting a small business and mitigating factors * Launch of a small business | * Oral questioning * Individual/group assignments * Written tests |
| 1. Operate a small business | * Organizational structure of a small business * Managing small business finances * Book keeping * Business support services * Marketing for small businesses * Basic IT application in small business | * Individual/group assignments * Written tests |
| 1. Grow a small business | * Methods of growing/expanding a small business * Resources for growing small business * Small business growth plan * ICT and business growth | * Individual/group assignments * Written tests |

**Suggested Methods of Instruction**

* Instructor led facilitation of theory
* Demonstration by trainer
* assignments
* Role play
* Case study

**Recommended Resources**

* Case studies for small businesses
* Business plan template
* Laptop/ desktop computer
* Internet
* Telephone
* Writing materials

## EMPLOYABILITY SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/05/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

**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 * Emotional intelligence * Assertiveness * Developing and maintaining high self-esteem * Developing and maintaining positive self-image * Accountability and responsibility * Good work habits * Self-awareness * Financial literacy * Healthy lifestyle practices | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate critical safe work habits | * Stress and stress management * Punctuality and time consciousness * Interpersonal communication * Sharing information * Resources utilization * HIV and AIDS * Drug and substance abuse * Handling emerging issues | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate workplace learning | * Personal training needs identification and assessment * Cultural aspects of work * Application of learning * Safe use of technology * Identifying opportunities * Workplace innovation * Handling emerging issues * Future trends and concerns in learning | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate workplace ethics | * Meaning of ethics * Ethical perspectives * Values and beliefs * Organization code of ethics * Common ethical dilemmas * Organization culture * Corruption, bribery and conflict of interest * Privacy and data protection * Harassment and mutual respect * Financial responsibility/accountability * Etiquette * Emerging issues in ethics | * Written tests * Oral questioning * Portfolio of evidence * Third party report |

**Suggested Methods of Instruction**

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

**Recommended Resources**

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

## ENVIRONMENTAL LITERACY

**UNIT CODE**: MIN/CU/GEM/BC/06/3/A

**Relationship to Occupational Standards**:

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution and demonstrating sustainable resource use.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard | * Environmental Management and Coordination Act 1999 * Solid Waste Act * Storage of environmentally hazardous materials * Disposal of hazardous wastes * Types and uses of PPEs in line with environmental regulations * Occupational Safety and Health Act 2007 | * Written tests * Oral questions * Observation of work procedures |
| 1. Control environmental pollution | * Types of pollution * Environmental pollution control and management * Procedures for waste management | * Written tests * Oral questions * Observation of work procedures |
| 1. Demonstrate sustainable use of resource | * Types of resources * Sustainable resource use and management * Principles of 3Rs (Reduce, Reuse, Recycle) | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Instructor led facilitation theory
* Discussion
* Demonstration by trainer
* Assignments
* Field trip

**Recommended Resources**

* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Solid Waste Act
* Environmental Management and Coordination Act 1999
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)

## OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** MIN/CU/GEM/BC/07/3/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate safety and health practices

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to practice and promote safety and health at work. It entails preparing to practice safety and health at work and complying and promoting compliance of workers to organization’s occupational safety and health instructions and requirements.

**Summary of Learning Outcomes**

1. Prepare to apply workplace safety and health practices
2. Compliance with occupational safety and health Act

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare to apply workplace safety and health practices | * Awareness of legislation that outlines the minimum standards for occupational safety and health requirements/ regulations * Benefits of implementing an occupational safety and health program * Safety requirements/ regulations of own work and of other workers * Workplace standards and procedures for incidents and emergencies * Prevention and Control Measures for accidents, injuries and sickness | * Oral tests * Written questions * Observation of work procedures |
| 2. Compliance with occupational safety and health Act | * Safety instructions and safety signs * Safe handling of tools, equipment and materials * Use of safe guards and safety devices * Reporting of hazards, incidents, injuries and sickness in the workplace | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

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

**Recommended Resources**

* Occupational safety and health standards
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Client/supplier instructions
* Organizational or external personnel
* Machine/equipment manufacturer’s specifications and instructions
* Quality standards

# COMMON UNITS OF LEARNING

## GEOLOGY PRINCIPLES

**UNIT CODE:** MIN/CU/GEM/CC/01/3/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 100 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 * Metamorphic, sedimentary and Igneous rocks of Kenya * Archean/ Greenstone belt rocks * Proterozoic/ 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

# CORE UNITS OF LEARNING

## GEMSTONE IDENTIFICATION

**UNIT CODE:** MIN/CU/GEM/CR/01/3/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 100 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, illuminating gemstone optical properties, performing specific gravity test, testing refractive index and conducting optical microscopic 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

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Perform thermal test | * Basics of Geology * Definition of gemstone * Properties of gemstone * Classification of gemstones * Thermal inertia principles * Methods of testing thermal inertial * 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 | * Practical * Written tests * Observation * Oral questioning * Third party report |
| 1. Perform hardness test | * Definition of hardness * Moh’s hardness scale * Tools and equipment for hardness test * Hardness testing procedure * Hardness result recording | * Practical * Written tests * Observation * Oral questioning * Third party report |
| 1. Illuminate gemstone optical properties | * Optical properties of gemstone under light * Illumination and usage of 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 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 * Refractive properties of gemstones * Introduction to Snell’s law * Tools and equipment for refractive index test * Safety and handling of tools and equipment * Procedure of testing refractive index * Reading and recording of refractive index | * Practical * Written tests * Observation * Oral tests |
| 1. Conduct optical microscopic test | * Optical properties of gemstones observable under microscope * Gemmological microscope * Operation and handling of Gemmological microscope * Recording results | * 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

**List of 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

## GEMSTONE PROCESSING

**UNIT CODE:** MIN/CU/GEM/CR/02/3/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 120 hours

**Unit Description**

This unit specifies the competencies required to carry out gemstone processing stones. 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. Perform gemstone cutting
3. Conduct gemstone pre-shape
4. Perform gemstone faceting
5. Perform gemstone polishing
6. Perform gemstone treatment

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify gemstones | * + Basics of Geology   + Definition of gemstone   + Properties of gemstone   + 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   + Practical   + Observation   + Oral questioning   + Interviewing |
| 1. Perform gemstone cutting | * + Gemstone cutting   + Types of gemstone cut   + Safety measures when cutting gemstones   + Gemstone cutting equipment and consumables   + Safety and handling of tools and equipment   + Gemstone defects and features   + Procedure for gemstone cutting | * + Written tests   + Practical   + Observation   + Oral test   + Third party report |
| 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 faceting | * + Introduction to faceting   + Types of gemstone cuts   + Gem faceting machine, consumables and their operation   + Safety measures when handling faceting equipment’s   + Procedure of faceting gemstones | * + Written tests   + Practical   + Observation   + Oral questioning   + Third party report |
| 1. Perform gemstone polishing | * + Concept of polishing   + Types of polishing powder   + Gem faceting machine, consumables and their operation   + 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 measurements 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   + Practical’s   + Observation   + Oral questioning   + Third party report |

**Suggested Methods of Delivery:**

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

**List of 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

## CRAFTING JEWELLERY PRODUCTS

**UNIT CODE:** MIN/CU/GEM/CR/03/3/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 80 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

**List of 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
* Chelsea filter