

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**GEMMOLOGY**

**LEVEL 4**



**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 delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, 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.

**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/01/4/A**

Industry or sector

Curriculum

Occupational area

Type of Unit

Unit number

Competency level

Control version

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# COURSE OVERVIEW

Gemmology Level 4 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 crafting jewellery products and gemstone marketing,

The units of competency comprising Gemmology certificate level 5 qualifications include the following:

**BASIC UNITS OF LEARNING**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/BC/01/4/A** | Communication skills | 20 | 2.0 |
| **MIN/CU/GEM/BC/02/4/A** | Numeracy skills | 25 | 2.5 |
| **MIN/CU/GEM/BC/03/4/A** | Digital literacy | 35 | 3.5 |
| **MIN/CU/GEM/BC/04/4/A** | Entrepreneurial skills | 60 | 6.0 |
| **MIN/CU/GEM/BC/05/4/A** | Employability skills | 30 | 3.0 |
| **MIN/CU/GEM/BC/06/4/A** | Environmental literacy | 20 | 2.0 |
| **MIN/CU/GEM/BC/07/4/A** | Occupational safety and health practices | 20 | 2.0 |
| **Total** | | **210** | **21.0** |

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/CC/01/4/A** | Geology principles | 100 | 10.0 |

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit factor** |
| **MIN/CU/GEM/CR/01/4/A** | Mine blasting | 80 | 8.0 |
| **MIN/CU/GEM/CR/01/4/A** | Gemstone identification | 100 | 10.0 |
| **MIN/CU/GEM/CR/02/4/A** | Gem stone grading | 90 | 9.0 |
| **MIN/CU/GEM/CR/03/4/A** | Gemstone processing | 120 | 12.0 |
| **MIN/CU/GEM/CR/04/4/A** | Crafting jewellery products | 80 | 8.0 |
|  | Industrial attachment | 300 | 30.0 |
| **Total** | | **770** | **77.0** |
| **Grand total** | | **1080** | **108.0** |

**Entry Requirements**

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

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

**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 4, 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/01/4/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 20 Hours

**Unit Description**

This unit covers the competencies required demonstrate communication skills. It involves obtaining and conveying workplace information, completing relevant work-related documents, communicating information about workplace processes, leading workplace discussion and communicating workplace issues.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Complete relevant work-related documents
3. Communicate information about workplace processes
4. Lead workplace discussions
5. Identify and communicate issues arising in the workplace

**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 | * Interview * Third party reports |
| 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 | * Interview * Third party reports |
| 1. Communicate information about workplace processes | * 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 | * Interview * Portfolio |
| 1. Lead workplace discussion | * Methods of discussion e.g.   + Coordination meetings   + Toolbox discussion   + Peer-to-peer discussion * Solicitation of response | * Interview * Third party reports |
| 1. Identify and communicate issues arising in the workplace | * Identification of problems and issues * Organizing information on problems and issues * Relating problems and issues * Communication barriers affecting workplace discussions | * Interview * Portfolio |

**Suggested Methods of Instruction**

* Direct instruction
* Demonstration
* Practice assignment
* Discussion
* Role play
* Brainstorming

**Recommended Resources**

* Desktop computers/laptops
* Internet connection
* Projectors
* Telephone
* Report writing templates

## NUMERACY SKILLS

**UNIT CODE:** **MIN/CU/GEM/BC/02/4/A**

**Relationship to Occupational Standards:**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 25hours

**Unit Description**

This unit covers the competencies required to demonstrate numeracy skills. It involves identifying and using whole numbers and simple fractions, decimals and percentages for work, identifying, measuring and estimating familiar quantities for work, reading and using familiar maps, plans and diagrams for work, identifying and describing common 2D and some 3D shapes for work, constructing simple tables and graphs for work using familiar data and identifying and interpreting information in familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Identify and use whole numbers and simple fractions, decimals and percentages for work
2. Identify, measure and estimate familiar quantities for work
3. Read and use familiar maps, plans and diagrams for work
4. Identify and describe common 2D and some 3D shapes for work
5. Construct simple tables and graphs for work using familiar data
6. Identify and interpret information in familiar tables, graphs and charts for work

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify and use whole numbers and simple fractions, decimals and percentages for work | * Whole numbers * Simple fractions * Decimals * Percentages * Sizes * Problem solving methods * Calculations using the 4 operations * Recording and communicating numerical information | * Written * Practice assignments |
| 1. Identify, measure and estimate familiar quantities for work | * Measurement information * Units of measurement * Estimate familiar and simple amounts * Selection of appropriate measuring equipment * Calculate using familiar units of measurement * Check measurements and results against estimates * Using informal and some formal mathematical and general language * Record or report results | * Written * Practice assignments |
| 1. Read and use familiar maps, plans and diagrams for work | * Maps, plans and diagrams * Locate items and places in familiar maps, plans and diagrams * Recognize common symbols and keys in familiar maps, plans and diagrams * Direction and location of objects, or route or places * Use of informal and some formal oral mathematical language and symbols | * Practical test * Written |
| 1. Identify and describe common 2D and some 3D shapes for work | * Common 2D shapes and 3D shapes * Classification of common 2D shapes and designs * Description of Use informal and some formal language to describe common two-dimensional shapes and some common three-dimensional shapes * Construction of common 2D shapes * Match common 3D shapes to their 2D sketches or nets | * Written * Practical test |
| 1. Construct simple tables and graphs for work using familiar data | * Types of graphs * Determination of data to be collected * Selection of data collection method * Collection of data * Determination of variables from the data collected * Order and collate data * Construct a table and enter data * Construct a graph using data from table * Check results * Report or discuss graph information related to work using informal and some formal mathematical and general language | * Written * Practical test |
| 1. Identify and interpret information in familiar tables, graphs and charts for work | * Tables construction and labeling * i.e. title, headings, rows and columns * Interpreting information and data in simple tables * Relaying information of relevant workplace tasks on/in a table * Identify familiar graphs and charts in familiar texts and contexts * Locate title, labels, axes, scale and key from familiar graphs and charts * Identify and interpret information and data in familiar graphs and charts * Relate information to relevant workplace tasks | * Written * Practical test |

**Suggested Methods of Instruction**

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

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* LCD projectors
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Projectors
* Writing boards
* Mathematical tables

## DIGITAL LITERACY

**UNIT CODE: MIN/CU/GEM/BC/03/4/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 35 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 task sand applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer software and hardware
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 | * Meaning of a computer * Functions of a computer * Components of a computer * Classification of computers | * Written tests * Oral * Observation |
| 1. Apply security measures to data, hardware and software | * Data security and control * Security threats and control measures * Types of computer crimes * Detection and protection against computer crimes | * Written tests * Oral presentation * Observation * Projects |
| 1. Apply computer software in solving tasks | * Operating system * Word processing * Spread sheets * Data base | * Oral questioning * Observation * Project |
| 1. Apply internet and email in communication at workplace | * Computer networks * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Observation * Oral presentation * Written report |

**Suggested Methods of Instruction**

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

**Recommended Resources**

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

## ENTREPRENEURIAL SKILLS

**UNIT CODE: MIN/CU/GEM/BC/04/4/A**

**Relationship to occupational standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 60 hours

**Unit description**

This unit covers the competencies required for creating and maintaining small scale business, establishing small business customer base, managing and growing a micro/small-scale business.

**Summary of Learning Outcomes**

1. Create and maintain small scale business
2. Establish small scale business customer base
3. Manage small scale business
4. Grow/expand small scale business

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Create and maintain small scale business | * Starting a small business * Legal regulatory requirements in starting a small business * SWOT/ PESTEL analysis * Conducting market/industry survey * Generation and evaluation of business ideas * Matching competencies with business opportunities * Forms of business ownership * Location of a small business * Legal and regulatory requirement * Resources required to start a small business * Common terminologies in entrepreneurship * Entrepreneurship in national development * Self-employment * Formal and informal employment * Entrepreneurial culture * Myths associated with entrepreneurship * Types, characteristics, qualities & role of entrepreneurs * History, development and importance of entrepreneurship * Theories of entrepreneurship * Quality assurance for small businesses * Policies and procedures on occupational safety and health and environmental concerns | * Individual/group assignments * projects * Written * Oral |
| 1. Establish small scale business customer base | * Good staff/workers and customer relations * Marketing strategy * Identifying and maintain new customers and markets * Product/ service promotions * Products / services diversification * SWOT / PESTEL analysis * Conducting a business survey * Generating Business ideas * Business opportunities | * Individual/group assignments * projects * Written * Oral |
| 1. Manage small scale business | * Organization of a small business * Small business’ business plan * Marketing for small businesses * Managing finances for small business * Production/ operation process for goods/services * Small business records management * Book keeping and auditing for small businesses * Business support services * Small business resources mobilization and utilization * Basic business social responsibility * Management of small business * Word processing concepts in small business management * Computer application software * Monitoring and controlling business operations | * Oral * Individual/group assignments * projects * Written |
| 1. Grow/expand small scale business | * Methods of growing small business * Resources for growing small business * Small business growth plan * Computer software in business development * ICT and business growth | * Individual/group assignments * projects * Written |

**Suggested Methods of Instruction**

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

**Recommended Resources**

* Case studies for small businesses
* Business plan templates
* Lap top/ desk top computer
* Internet
* Telephone
* Writing materials

## EMPLOYABILITY SKILLS

**UNIT CODE:** MIN/CU/GEM/BC/05/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 30 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 * Expressing personal thoughts, feelings and beliefs * Developing and maintaining high self-esteem * Developing and maintaining positive self-image * Articulating ideas and aspirations * Accountability and responsibility * Good work habits * Self-awareness * Self-development * Financial literacy * Healthy lifestyle practices | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate critical safe work habits | * Stress and stress management * Punctuality and time consciousness * Interpersonal communication * Sharing information * Leisure * Integratingpersonal objectives into organizational objectives * Resources utilization * Setting work priorities * HIV and AIDS * Drug and substance abuse * Handling emerging issues | * Written tests * Oral questioning * Portfolio of evidence * Third party report |
| 1. Demonstrate workplace learning | * Personal training needs identification and assessment * Managing own learning * Contributing to the learning community at the workplace * Cultural aspects of work * Variety of learning context * Application of learning * Safe use of technology * Identifying opportunities * Workplace innovation * Performance improvement * 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 * Principles of ethics * Values and beliefs * Ethical standards * Organization code of ethics * Common ethical dilemmas * Organization culture * Corruption, bribery and conflict of interest * Privacy and data protection * Diversity, harassment and mutual respect * Financial responsibility/accountability * Etiquette * Personal and professional integrity * Commitment to jurisdictional laws * Emerging issues in ethics | * Written tests * Oral questioning * 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/06/4/A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 20hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard, controlling environmental pollution, demonstrating sustainable resource use and evaluating current practices in relation to resource usage.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental pollution
3. Demonstrate sustainable use of resources
4. Evaluate current practices in relation to resource usage

**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 * Purposes and content of Solid Waste Act * Storage methods for environmentally hazardous materials * Disposal methods of hazardous wastes * Types and uses of PPE in line with environmental regulations * Occupational Safety and Health Standards (OSHS) | * Written tests * Oral questions * Observation of work procedures |
| 1. Control environmental Pollution | * 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 tests * Oral questions * Observation of work procedures * 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 tests * Oral questions * Observation of work procedures |
| 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 tests * Oral questions * Observation of work procedures |
| 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 tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

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

**Recommended Resources**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Machine/equipment manufacturer’s specifications and instructions
* Personal Protective Equipment (PPE)

## OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** MIN/CU/GEM/BC/07/4/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 20 hours

**Unit Description**

This unit specifies the competencies required to practice safety and health and comply with OSH requirements relevant to work. It involves adhering to workplace procedures for hazards and risk prevention and participating in arrangements for workplace safety and health maintenance.

**Summary of Learning Outcomes**

1. Adhere to workplace procedures for hazards and risk prevention
2. Participate in arrangements for workplace safety and health maintenance

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment**  **Methods** |
| 1. Adhere to workplace procedures for hazards and risk prevention | * Arrangement of work area and items in accordance with Company housekeeping procedures * Adherence to work standards and procedures * Application of preventive and control measures, including use of safety gears/PPE * Study and apply standards and procedures for incidents and emergencies. | * Oral questions * Written tests * Portfolio of evidence * Third party report |
| 1. Participate in arrangements for workplace safety and health maintenance | * Participating in orientations on OSH requirements/regulations of tasks * Providing feedback on health, safety, and security concerns to appropriate personnel as required in a sufficiently detailed manner * Practice workplace procedures for reporting hazards, incidents, injuries and sickness * OSH requirements/ regulations and workplace safety and hazard control procedures are reviewed, and compliance reported to appropriate personnel * Identification of needed OSH-related trainings are proposed to appropriate personnel | * 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**

* Computers
* Stationery
* Charts
* Video clips
* Audio tapes
* Radio sets
* TV sets
* LCD projectors
* 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 bootsn
* 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/01/4/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 * 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

# CORE UNITS OF LEARNING

## MINE BLASTING

**UNIT CODE:** MIN/CU/GEM/CR/01/4/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: **Conduct mine blasting**

**Duration of Unit:** 80 hours

**Unit Description**

This unit specifies the competencies required to conduct mine blasting. It involves obtaining blast authorization/compliance, planning blasting activities, procuring mine explosives, storing mine explosives, designing mine blast, charging blast holes, securing blast area, detonating/blasting explosives and inspecting blasted areas.

**Summary of Learning Outcomes**

1. Obtain blast authorization/compliance
2. Plan blasting activities
3. Procure mine explosives
4. Store mine explosives
5. Design mine blast
6. Secure blast area
7. Detonate/blast explosives
8. Inspect blasted areas

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Obtain blast authorization/compliance | * Explosives Act * Blaster roles and duties * Blaster training needs * Blaster registration process * Blaster’s registration certificate | * Practicals * Written tests * Observation * Assignment * Oral questioning * Third party report |
| 1. Plan blasting activities | * Explosives needs assessment * Identification of required explosives * Explosive needs calculations * Selection of explosive area * Explosive area demarcation * Explosive impacts. * Controlled blasting | * Practicals * Written tests * Observation * Assignment * Oral questioning * Third party report |
| 1. Procurement mine explosives | * Identification of Authorized explosive dealers * Functions of Inspector of explosives office. * Explosive purchase permit * Explosive procurement process * Transportation of explosives | * Practicals * Written tests * Observation * Oral questioning * Third party report * Assignment |
| 1. Store mine explosives | * Construction of Explosive magazine * Tools and equipment in Explosive magazine * Storage of explosives in the magazine * Explosive storage register * Explosives documentation | * Practicals * Observation * Oral tests * Assignment |
| 1. Design mine blast | * Calculation of explosive holes details * Blasting tools and equipment * Charging Blast holes * Drilling services * Calculation of required explosives | * Practical * Written tests * Observation * Assignment |
| 1. Secure blast area | * Carrying out Public awareness * Reporting Blasting activity to relevant authority * Relocation of people and animals from explosive site * Marking Explosive site * Occupational, Safety and Health Act * Mining Act * Appropriate Personal Protective Equipment | * Practicals * Written tests * Observation * Oral tests * Assignment |
| 1. Detonate/blast explosives | * Setting blasting site * Securing blasting site * Counterchecking required parameters * Detonating blast | * Practical * Written tests * Observation * Oral tests * Assignment |
| 1. Inspect blasted mines | * Blasted area assessment * Carrying out Visual inspection * Unexploited explosives * Handing over Blasted mine | * Practical * Written tests * Observation * Assignment |

**Suggested Methods of instruction:**

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

**Recommended Resources:**

* Copies of Explosive Act cap 115
* Explosives
* Detonators
* Vibrometer
* Personal Protective equipment
* Demonstration explosive magazine
* Drilling rig
* Reference materials
* Alerting tapes
* Public addressing system

## GEMSTONE IDENTIFICATION

**UNIT CODE:** MIN/CU/GEM/CR/02/4/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 principle * Methods of testing thermal inertial * Thermal conductivity of different materials | * Practicals * Written tests * Observation * Oral questioning * Third party report * Assignment |
| 1. Identify gemstone colour | * Standard colour chart * Electromagnetic spectrum * Factors affecting colour in gemstones | * Practicals * Written tests * Observation * Oral questioning * Third party report * Assignment |
| 1. Perform hardness test | * Definition of hardness * Moh’s hardness scale * Tools and equipment for hardness test * Hardness testing procedure * Hardness result recording | * Practicals * Written tests * Observation * Oral questioning * Third party report * Assignment |
| 1. Illuminate gemstone optical properties | * Optical properties of gemstone under light * Usage of illumination tools and equipment * Recording of results for optical properties of gemstone | * Practicals * Observation * Oral tests * Assignment |
| 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 | * Practicals * Written tests * Observation * Assignment |
| 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 | * Practicals * Written tests * Observation * Oral tests * Assignment |
| 1. Conduct optical microscopic test | * Optical properties of gemstones observable under microscope * Gemmological microscope * Operation and handling of Gemmological microscope * Recording results | * Practicals * 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 samples
* Gem cloth
* Microscope
* Chelsea filter
* 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
* Teaching aids

## GEM STONE GRADING

**UNIT CODE:** MIN/CU/GEM/CR/03/4/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 90 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 color
4. Grade gemstone by carat weight

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

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Grade gem stone by clarity | * Introduction to grading of gemstones according to 4C’s (cut gems) and 2C’s and 2S (rough gems) * 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) * Valuation of graded gemstone | * Practicals * 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 * Valuation of cut gemstone | * Written tests * Practicals * Observation * Oral tests * Note taking * Third party report |
| 1. Grade gem stone by Color | * 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 colour grading * Recording grading by colour * Valuation of coloured gemstone | * Written tests * Observation * Oral test * Third party report * Note taking |
| 1. Grade by weight | * Definition of carat * Units of measurement and conversion * Gemstone carat weighing balance * Recording grading by carat weight * Valuation of gemstone graded by carat weight | * Practicals * 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
* Mine site visits

**Recommended Resources:**

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

## GEMSTONE PROCESSING

**UNIT CODE:** MIN/CU/GEM/CR/04/4/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. Conduct gemstone pre-shape
3. Perform gemstone cutting
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   + Practicals   + 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   + Practicals   + Observation   + Oral questioning |
| 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   + Practicals   + Observation   + Oral test   + Third party report |
| 1. Perform gemstone faceting | * + Introduction to faceting   + Types of gemstone cuts   + Gem faceting machine operation and usage of consumables   + Safety measures when handling faceting equipment and consumables   + Procedure of faceting gemstones | * + Written tests   + Practicals   + Observation   + Oral questioning   + Third party report |
| 1. Perform gemstone polishing | * + Concept of polishing   + Types of polishing powder   + Gem faceting machine operation and usage of consumables   + Procedure of polishing gemstones   + Procedure of handling polished gemstones | * + Written tests   + Practicals   + 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   + Practicals   + Observation   + Oral questioning   + Third party report |

**Suggested Methods of instructions:**

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

**Recommended Resources:**

* Gemstone sample
* refractometer
* Gem cloth
* Gemstone heating machine
* Microscope
* Tweezers or a gem holder
* Callipers or a micrometre
* Light source
* Hydrostatic weighing scale
* Loupe(10x)
* Refractive index fluid
* Gem faceting machine
* Gem polishing plates
* Abrasives
* Treatment chemicals
* Reference materials

## CRAFTING JEWELLERY PRODUCTS

**UNIT CODE:** MIN/CU/GEM/CR/05/4/A

**Relationship to Occupational Standards**

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

**Duration of Unit:** 80hours

**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 | * Practicals * Written tests * Observation * Oral tests * Third party report * Assignment |
| 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 | * Practicals * Written tests * Observation * Oral tests * Assignment * Third party report |
| 1. Conduct jewellery finishing | * Basic concepts of jewellery finishing * Mounting tools, equipment and consumables * Safety measures when mounting * Methods of jewellery finishing * Finishing procedures | * Practicals * Written tests * Observation * Oral questioning * Assignment |
| 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 | * Practicals * Written tests * Observation * Oral questioning * Assignment |

**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
* Loupe
* Chelsea filter
* Reference materials